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Docket: 14598.01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	John W. Countz	
Application No.:	10/642,359	
Filing Date:	August 15, 2003	Examiner: Sameh H. Tawfik
Title:	Positive Atmosphere Packaging Press & Sealer	Group Art Unit: 3721

TRANSMITTAL LETTER

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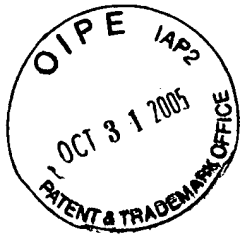
The present communication responds to the Notice of Non-Compliant Appeal Brief dated September 29, 2005. Enclosed herewith please find an Amended Appeal Brief.

Respectfully submitted,

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

John W. Countz

Appln. No.: 10/642,359

Filed: August 15, 2003

Title: Positive Atmosphere Packaging Press Sealer

Examiner: S. Tawfik

Group Art Unit: 3721

APPELLANT'S BRIEF

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TABLE OF CONTENTS

	Page
TABLE OF CASES AND OTHER AUTHORITIES.....	ii
Federal Circuit and Predecessors	ii
Manual of Patent Examining Procedure	ii
 APPELLANT’S BRIEF.....	 1
Real Party In Interest	1
Related Appeals and Interferences.....	1
Status of Claims	1
Status of Amendments	1
Summary of Claimed Subject Matter.....	1
Grounds of Rejection to be Reviewed	2
Summary of Invention	2
Issues.....	3
Grouping of Claims.....	4
Argument	4
(i) Claim Rejections – 35 U.S.C. § 102(b)	4
(a) Rejection of claims 1-4, 6-9, and 18-20 as anticipated by Atkins et al.	4
(1) The anticipation rejection based on Atkins et al. should be withdrawn because Atkins et al. fail to disclose various elements of independent claims 1 and 18, including “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.”	4
(ii) Claim Rejection – 35 U.S.C. § 103(a)	7
(a) Rejection of claim 5 as obvious over Atkins et al.	8
(1) The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.	8
(2) The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a gas inlet for injecting gas into the packaging material to purge an interior of the packaging material before compressing the packaging material, wherein the gas is selected from the group consisting of Ar, CO ₂ , or CO.	9
Conclusion	10
 APPENDIX for Appellant’s brief	 A-1
Claims Appendix	A-2
U.S. Patent 4,457,122 to Atkins et al. (“Atkins”)	Tab 1

TABLE OF CASES AND OTHER AUTHORITIES

Federal Circuit and Predecessors

Trintec Industries, Inc. v. Top-U.S.A. Corp., 295 F.3d 1292 (Fed. Cir. 2002).

In re Haruna, 249 F.3d 1327 (Fed. Cir. 2001).

Brown & Williamson Tobacco Corp. v. Philip Morris, Inc., 229 F.3d 1120 (Fed. Cir. 2000).

Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565 (Fed. Cir. 1991).

Richardson v. Suzuki Motor Co., 868 F.2d 1226 (Fed. Cir. 1989).

Ex parte Clapp, 227 USPQ 972 (Bd. Pat. App. & Inter. 1985).

In re Royka, 490 F.2d 981 (C.C.P.A. 1974).

In re Wilder, 429 F.2d 447 (C.C.P.A. 1970).

In re Ratti, 270 F.2d 810 (C.C.P.A. 1959).

Manual of Patent Examining Procedure

MPEP § 2131.

MPEP §2142.

MPEP §2143.



APPELLANT'S BRIEF

This appeal is taken in response to the Final Office Action of February 22, 2005, wherein all of the pending claims of U.S. Patent Application No. 10/642,359 were finally rejected.

REAL PARTY IN INTEREST

The real party in interest is Excel Corporation as evidenced by the Assignment recorded at Reel 014784, Frame 0991.

RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences related to this appeal.

STATUS OF CLAIMS

Claims 1-9 and 18-20 are pending. All of these pending claims are under final rejection. Specifically, the Final Office Action rejected:

- (a) claims 1-4, 6-9, and 18-20 under 35 U.S.C. § 102(b); and
- (b) claim 5 under 35 U.S.C. § 103(a).

Claims 1-9 and 18-20 are appealed. A copy of the appealed claims appears in the Appendix.

STATUS OF AMENDMENTS

Claim 1 was amended in an Amendment after Final Rejection dated April 21, 2005. That amendment was entered, as indicated in the Advisory Action dated May 13, 2005.

SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1 and 18 are independent.

Claim 1 recites a positive-pressure packaging system 30 comprising a platen 33, a dome 34, a seal assembly 50, and a pressure source 40. The platen 33 for receiving a product and a packaging material and the dome 34 moveable to a first position relative to the platen wherein the product may be placed on the platen, and a second position relative to the platen wherein the product is substantially enclosed inside of a pressure chamber defined by the platen and the dome, are discussed at least at paragraphs [013] and [014] of the present application, at page 3, line 23 through page 4, line 10. The seal assembly 50 for operatively coupling the dome to the platen in the second position and for straitening the open end, wherein the seal assembly is adapted to allow expulsion of fluids from the pressure chamber, is discussed at least at paragraph [020] of the present application, at page 6, lines 12-14. The pressure source 40 operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the

packaging material is compressed against the product is discussed at least at paragraphs [016] through [018] of the present application, at page 4, lines 20-22 and page 5, line 1 through page 6, line 2.

Claim 18 recites a positive-pressure packaging system 30 comprising a platen 33, a pressure dome 34, a seal assembly 50, a pressure source 40, and a sealing device 53. The platen 33 having a substantially flat surface and the pressure dome 34 moveable between a first open position relative to the platen wherein the flat surface is exposed to ambient pressure, and a second closed position relative to the platen substantially sealing the dome against the platen to form a pressure chamber, are discussed at least at paragraphs [013] and [014] of the present application, at page 3, line 23 through page 4, line 10. The seal assembly 50 for corrugating an open end of a package located on the flat surface as the dome moves to the second position is discussed at least at paragraph [020] of the present application, at page 6, lines 12-14. The pressure source 40 coupled to the dome for increasing pressure within the pressure chamber relative to the ambient pressure so that the open package is compressed against the product, wherein the seal assembly allows expulsion of fluids from the package through the open end thereof and inhibits expulsion of a particulate, is discussed at least at paragraphs [016] through [018] of the present application, at page 4, lines 20-22 and page 5, line 1 through page 6, line 2. The sealing device 53 on at least one of the platen and the dome and configured to seal the package after the package has been compressed is discussed at least at paragraph [023] of the present application, at page 7, lines 16-29.

GROUND OF REJECTION TO BE REVIEWED

Claims 1-4, 6-9, and 18-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,457,122 to Atkins et al.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,457,122 to Atkins et al.

SUMMARY OF INVENTION

The present invention relates to a positive-pressure packaging system for packaging a product. The positive-pressure packaging system includes a platen, a dome, a seal assembly, and a pressure source:

The system includes a platen for receiving a product and a packaging material having an open end and a dome moveable to a first position relative to the platen wherein the product may be

placed on the platen, and a second position relative to the platen wherein the product is substantially enclosed inside of a pressure chamber defined by the platen and the dome. A seal assembly operatively couples the dome to the platen in the second position and straitens the open end. The seal assembly is adapted to allow expulsion of fluids from the pressure chamber. The system further includes a pressure source operably coupled with the dome for increasing pressure within the dome so that the packaging material is compressed against the product.

Specification As Filed, ¶006, page 2, lines 2-12. A rise in pressure, or a positive pressure, within the dome, compresses a bag, or packaging material, around the product:

In general, the pressure dome 34 functions to substantially enclose the open bag 32, and the product 31 contained therein, and to facilitate a rise in pressure within the pressure chamber 35. This rise in pressure compresses the walls of the open bag around the product 31, which may also lead to some compression of the product 31.

Specification As Filed, ¶018, page 5, lines 16-20.

More specifically, air or gas is supplied to the pressure chamber and the air or gas generates a rise in pressure in the pressure chamber, thereby applying direct positive pressure to the bag. The applied pressure compresses the bag against the product:

Incoming air through the pressure chamber ports 48 pressurizes the volume within the pressure chamber 35 and applies direct pressure to the outside of the bag 32, which contains both the product 31 and any residual air or atmosphere trapped inside the bag 32. The force of the applied pressure on the outside of the bag 32 compresses the open bag 32 against the product 31. As the open end of the bag 32 is restricted but nonetheless fluidly coupled to ambient or atmospheric pressure through seal assembly 50, the applied pressure compressing the bag 32 effects expulsion of residual atmosphere or air trapped inside the bag 32.

Specification As Filed, ¶028, page 9, line 27 – page 10, line 5.

ISSUES

- (i) Are the inventions defined in claims 1-4, 6-9, and 18-20 anticipated by U.S. Patent 4,457,122 to Atkins et al. (“Atkins et al.”) under 35 U.S.C. § 102(b)?
- (ii) Is the invention defined in claim 5 obvious over Atkins et al. under 35 U.S.C. § 103(a)?

GROUPING OF CLAIMS

The claims stand or fall together.

ARGUMENT

(i) Claim Rejections – 35 U.S.C. § 102(b)

(a) *Rejection of claims 1-4, 6-9, and 18-20 as anticipated by Atkins et al.*

- (1) **The anticipation rejection based on Atkins et al. should be withdrawn because Atkins et al. fail to disclose various elements of independent claims 1 and 18, including “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.”**

The Final Office Action rejected claims 1-4, 6-9, and 18-20 under 35 U.S.C. § 102(b) as being anticipated by Atkins et al. It is respectfully submitted that this rejection should be withdrawn because Atkins et al. fail to disclose each claim element.

For a prior art reference to anticipate a patent claim, the reference must expressly or inherently describe each and every limitation set forth in the patent claim. Trintec Industries, Inc. v. Top-U.S.A. Corp., 295 F.3d 1292, 1295 (Fed. Cir. 2002); MPEP § 2131. Every claim limitation positively recited must be given effect. In re Wilder, 429 F.2d 447, 450 (C.C.P.A. 1970). “The identical invention must be shown in as complete detail as is contained in the ... claim.” Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236 (Fed. Cir. 1989). There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1576 (Fed. Cir. 1991).

Appellant’s independent claim 1 in part recites, “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the packaging material is compressed against the product.” Appellant’s independent claim 18 in part recites, “a pressure source operably coupled with the dome for increasing pressure within the pressure chamber relative to the ambient pressure so that the open package is compressed against the product, wherein the seal assembly allows expulsion of fluids from the package through the open end thereof and inhibits expulsion of a particulate.”

Atkins et al. cannot anticipate the claims because it does not disclose increasing the pressure pursuant to a positive-pressure packaging system. Instead it discloses a vacuum packaging system. More specifically, Atkins et al. disclose a system for “vacuum packaging goods in heat shrinkable, thermoplastic bags in a vacuum chamber equipped with flexible, heated

diaphragms that can be collapsed upon a filled bag to heat to shrinking temperature.” *Atkins et al., Abstract*. Thus, unlike claims 1 and 18, Atkins et al. do not disclose “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.”

Using a positive pressure device is very different from using a vacuum device. Vacuum packaging devices generate a negative pressure within a bagged product that is inside, for example, a clamshell or platen within a dome chamber. The bag is then heat-sealed closed while under the generated vacuum. Producing vacuum energy with conventional vacuum packagers is expensive and evacuation of the bag-sealing chamber is time consuming. Further, the vacuum packagers generally do not efficiently compress the packaging tightly around the packaged product.

Atkins et al. disclose their device as follows. The system of Atkins et al. comprise an outer vacuum chamber having an upper platen and a lower platen. *Atkins et al., Column 3, lines 13-19*. A product “P”, pre-packaged into a bag “B” is put inside the vacuum chamber. *Column 3, lines 25-28*. Identical diaphragms are fixed to the lips of the upper and lower platens. *Atkins et al., Column 3, lines 33-36*. The diaphragms are deliver heat to the bagged goods and operate to heat shrink the bag onto the goods. *Atkins et al., Column 2, lines 53-64*. A vacuum V_D is drawn between the diaphragms and the platens to expand the diaphragms into contact with the platens:

As is quite clearly apparent from the FIGS. 1 and 2, when V_D is applied, the diaphragms expand out into contact with the platens, as shown in FIG. 3. When this pressure is relieved, as indicated in FIG. 4, then the diaphragms collapse onto the product “P”.

Atkins et al., Column 3, lines 53-58. A vacuum V_C is drawn in the vacuum chamber to evacuate the air from inside and outside of the bag. *Atkins et al., Column 5, lines 47-49*. The vacuum V_D is between the diaphragms and the platens is released while the vacuum V_C in the vacuum chamber is maintained:

The vacuum pressure V_D on the diaphragms is released or vented to atmosphere while the vacuum pressure in the chamber V_C continues.

Atkins et al., Column 5, lines 64-66. Venting to atmosphere between the diaphragms and the platens collapses the diaphragms onto the bag or product, thereby heat shrinking the bag. *Atkins et al.*, Column 5, line 66 – Column 6, line 1. The diaphragms collapse onto the bag because there is a vacuum between the diaphragms and the bag – not because the device uses “increase[ed] pressure ... relative to the ambient pressure,” as recited in every claim of the present application.

The Final Office Action asserts:

Atkins clearly discloses “a pressure source operably coupled with the dome for increasing pressure withing [sic] the dome”; Fig. 3; via by [sic] vacuuming the air out from dome 14 through conduits 30 and then releasing the vacuum means and allowing the atmospheric air to get in as shown in Fig. 4; that [sic] consider as pressure source because the atmospheric air will strongly get inside the dome 14 through conduits 30, which is source of pressure applied inside dome 14.

February 22, 2005 Final Office Action, page 5. Figure 4 of *Atkins et al.* illustrates a condition wherein a vacuum pressure is continued in the chamber, the vacuum condition collapsing and shrinking the bag driven by the hot diaphragms onto the product. *See Atkins et al.*, Column 5, line 64 – Column 6, line 2. *Atkins et al.* explicitly state that the vacuum pressure in the chamber V_C is continued to cause the diaphragms to collapse and shrink the bag against the product. There plainly is no pressure greater than ambient used anywhere in the *Atkins et al.* device.

An Advisory Action revises the argument, stating that the vacuum is an equivalent to a pressure source:

the examiner still believes that *Atkins*’s applied vacuum is equivalent to pressure source relative to the ambient. Note that it is inherent the pressure source is somehow coupled with the dome.

May 13, 2005, Advisory Action, continuation sheet. The Examiner thus argues that a vacuum used to pull a diaphragm against a bag in a chamber remaining under vacuum is an equivalent of a pressure source relative to ambient. A vacuum used to pull a diaphragm against a bag in a chamber remaining under vacuum is not “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure,” sufficient to support a rejection of the pending claims under § 102(b) as anticipated by *Atkins et al.*

First, the Appellant respectfully asserts that, even if a vacuum and/or releasing a vacuum to allow atmospheric air to press a diaphragm against a bag in a chamber remaining under vacuum were an equivalent to a pressure source for increasing pressure relative to the ambient

pressure, an equivalent is not an appropriate basis for an anticipation rejection under 35 U.S.C. § 102(b). For a reference to anticipate a claim, the identical invention must be shown in as complete detail as is contained in the claim. Atkins et al. do not show, at all, much less in any detail, a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.

Second, the Appellant respectfully submits that a vacuum and/or releasing a vacuum to allow atmospheric air to press a diaphragm against a bag in a chamber remaining under vacuum is not an equivalent of a pressure source for increasing pressure relative to the ambient pressure. The vacuum V_C in the vacuum chamber of Atkins et al. is maintained while the vacuum V_D between the diaphragms and the platens is vented. This vacuum causes the diaphragms to collapse on the bagged product, thereby heat-shrinking the bag onto the product. Thus, Atkins et al. describe that the vacuum pump evacuates air from inside and outside of the bag. *Atkins et al., Column 5, lines 47-49*. This vacuum is not released until the packaging has been completed. *Atkins et al., Column 6, lines 3-12*. This is not the same as, or an equivalent of, increasing pressure within the dome relative to ambient pressure. At best, Atkins et al. teach applying a vacuum pressure in the chamber and venting the diaphragms to atmosphere to allow pressure up to atmospheric pressure to press the diaphragms to the bag and heatshrink the bag. Atmospheric pressure is not increased pressure relative to ambient.

Further, a vacuum pump for drawing a vacuum within a vacuum chamber cannot fairly be considered a pressure source for increasing pressure in a dome relative to ambient pressure.

Thus, the Appellant respectfully submits that Atkins et al. fail to disclose, either literally or via equivalents, a “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure,” as recited by claims 1 and 18. For at least this reason, it is respectfully submitted that the Final Office Action fails to establish a prima facie case of anticipation for independent claims 1 and 18, and their dependent claims 2-4, 6-9, 19, and 20.

(ii) Claim Rejection – 35 U.S.C. § 103(a)

In order for a reference to establish a prima facie case of obviousness, three requirements must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Brown & Williamson Tobacco Corp. v. Philip Morris, Inc., 229 F.3d 1120, 1124-25 (Fed. Cir.

2000); *MPEP* §2143. Second, there must be a reasonable expectation of success. *Id.* Finally, the prior art reference must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974); *MPEP* §2143. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972,973 (Bd. Pat. App. & Inter. 1985); *MPEP* §2142.

Obviousness can only be established by modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references itself or in the knowledge generally available to one of ordinary skill in the art. *MPEP* §2143.01. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the reference are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810 (C.C.P.A. 1959); *MPEP* §2143.02. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be led in a direction divergent from the path that was taken by the applicant.” *In re Haruna*, 249 F.3d 1327, 1335 (Fed. Cir. 2001).

(a) *Rejection of claim 5 as obvious over Atkins et al.*

The Final Office Action rejected claim 5 under 35 U.S.C. § 103(a) over Atkins et al. It is respectfully submitted that this rejection should be withdrawn, because Atkins et al. fail to teach or suggest each claim element.

(1) The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.

Appellant’s independent claim 1 in part recites, “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the packaging material is compressed against the product.” Claim 5 depends indirectly from claim 1.

As discussed above, Atkins et al. disclose a vacuum pressure packaging system for packaging goods in heat shrinkable, thermoplastic bags. Atkins et al. do not disclose a positive-

pressure packaging system including “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure,” as recited by claim 1. Nothing in Atkins et al. suggests a positive pressure packaging system.

Three requirements must be met for a reference to establish a prima facie case of obviousness: (1) there must be some suggestion or motivation to modify the reference; (2) there must be a reasonable expectation of success; and (3) the prior art reference must teach or suggest all the claim limitations. Atkins et al. teach a vacuum pressure packaging system; the requisite suggestion, teaching, or motivation for modifying Atkins et al. to produce a positive-pressure packaging system is lacking. Atkins et al. do not teach or suggest any manner of successfully providing a positive-pressure system. Lastly, Atkins et al. do not teach, in any form, a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure. Instead, by teaching use of a vacuum, Atkins et al. teach away from the use of positive-pressure.

Therefore, it is respectfully submitted that the Final Office Action fails to establish a prima facie case of obviousness as to rejected claim 5.

- (2) **The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a gas inlet for injecting gas into the packaging material to purge an interior of the packaging material before compressing the packaging material, wherein the gas is selected from the group consisting of Ar, CO₂, or CO.**

Appellant’s claim 5, including the limitation from claim 4, from which it depends, in part recites, “a gas inlet for injecting gas into the packaging material to purge an interior of the packaging material before compressing the packaging material, wherein the gas is selected from the group consisting of Ar, CO₂, or CO.”

Atkins et al. teach evacuating air from inside and outside of the bag. *Atkins et al.*, Column 5, lines 47-49. There is no teaching or suggestion of injecting gas into the bag prior to compressing the packaging material. Indeed, Atkins et al. appear to teach away from injecting gas into the bag insofar as injecting gas is counter to evacuating air to draw a vacuum.

For at least this reason, it is respectfully submitted that Atkins et al. does not provide a teaching that covers all elements of claim 5 and its base claim 1 and therefore fails to establish a prima facie case of obviousness against claim 5.

CONCLUSION

In light of the foregoing, the Appellant submits that the appealed claims meet the requirements for patentability. Therefore, the Appellant respectfully requests that the Board reverse and withdraw each of the rejections.

Respectfully submitted,

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Customer Number 32320

Date: October 31, 2005

By: Alicia Griffin Mills
Alicia Griffin Mills, Reg. No. 46,933



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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

John W. Countz

Appln. No.: 10/642,359

Filed: August 15, 2003

Title: Positive Atmosphere Packaging Press Sealer

Examiner: S. Tawfik

Group Art Unit: 3721

APPENDIX

For Appellant's Brief

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PENDING CLAIMS

1. A positive-pressure packaging system comprising:
 - a platen for receiving a product and a packaging material having an open end;
 - a dome moveable to a first position relative to the platen wherein the product may be placed on the platen, and a second position relative to the platen wherein the product is substantially enclosed inside of a pressure chamber defined by the platen and the dome;
 - a seal assembly for operatively coupling the dome to the platen in the second position and for straitening the open end, wherein the seal assembly is adapted to allow expulsion of fluids from the pressure chamber; and
 - a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the packaging material is compressed against the product.
2. The system of claim 1 further comprising a sealing device on at least one of the platen and the dome configured to seal the packaging material after the packaging material has been compressed.
3. The system of claim 2 wherein the sealing device includes a heating element configured to provide the package with a hermetic seal.
4. The system of claim 2 further comprising a gas inlet for injecting a gas into the packaging material to purge an interior of the packaging material before compressing the packaging material.
5. The system of claim 4 wherein the gas is selected from the group consisting of Ar, CO₂, or CO.
6. The system of claim 1 wherein the pressure source includes an air compressor operably coupled with the dome to provided pressurized air to the pressure chamber.

7. The system of claim 1 wherein the pressure source includes an expandable bladder configured to expand and exert pressure against the packaging material.
8. The system of claim 1 wherein the seal assembly is a labyrinth structure that allows passage of fluids and obstructs passage of particulates.
9. The packager of claim 1 wherein the packaging material includes multiple layers of a webbing.
- 10-17.(Canceled)
18. A positive-pressure packaging system comprising:
a platen having a substantially flat surface;
a pressure dome moveable between a first open position relative to the platen wherein the flat surface is exposed to ambient pressure, and a second closed position relative to the platen substantially sealing the dome against the platen to form a pressure chamber;
a seal assembly for corrugating an open end of a package located on the flat surface as the dome moves to the second closed position;
a pressure source operably coupled with the dome for increasing pressure within the pressure chamber relative to the ambient pressure so that the open package is compressed against the product, wherein the seal assembly allows expulsion of fluids from the package through the open end thereof and inhibits expulsion of a particulate; and
a sealing device on at least one of the platen and the dome configured to seal the package after the package has been compressed.
19. The system of claim 18 wherein the seal assembly includes a first labyrinth structure provided on the flat surface of the platen, and a second labyrinth structure provided on the pressure dome, the first and second labyrinth structures being engageable so as to form a closed

seal that allows the passage of fluids under increased pressure.

20. The system of claim 19 wherein the sealing device includes a first heat-sealing component on the platen, and a second heat-sealing component on the pressure dome and positioned to substantially abut against the first heat-sealing component when the pressure dome is in the closed position.

United States Patent [19]

Atkins et al.

[11] Patent Number: 4,457,122

[45] Date of Patent: Jul. 3, 1984

[54] VACUUM PACKAGING GOODS IN HEAT SHRINKABLE PLASTIC BAGS USING FLEXIBLE DIAPHRAGMS

[75] Inventors: J. Harell Atkins, Duncan; Joseph E. Owensby, Spartanburg, both of S.C.

[73] Assignee: W. R. Grace & Co., Cryovac Div., Conn.

[21] Appl. No.: 295,155

[22] Filed: Aug. 21, 1981

[51] Int. Cl.³ B65B 31/02

[52] U.S. Cl. 53/434; 53/512; 53/442; 53/557

[58] Field of Search 53/434, 442, 512, 557

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Primary Examiner—Kuang Y. Lin

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[57] ABSTRACT

A method and apparatus for vacuum packaging goods in heat shrinkable, thermoplastic bags in a vacuum chamber equipped with flexible, heated diaphragms that can be collapsed upon a filled bag to heat it to shrinking temperature.

15 Claims, 5 Drawing Figures

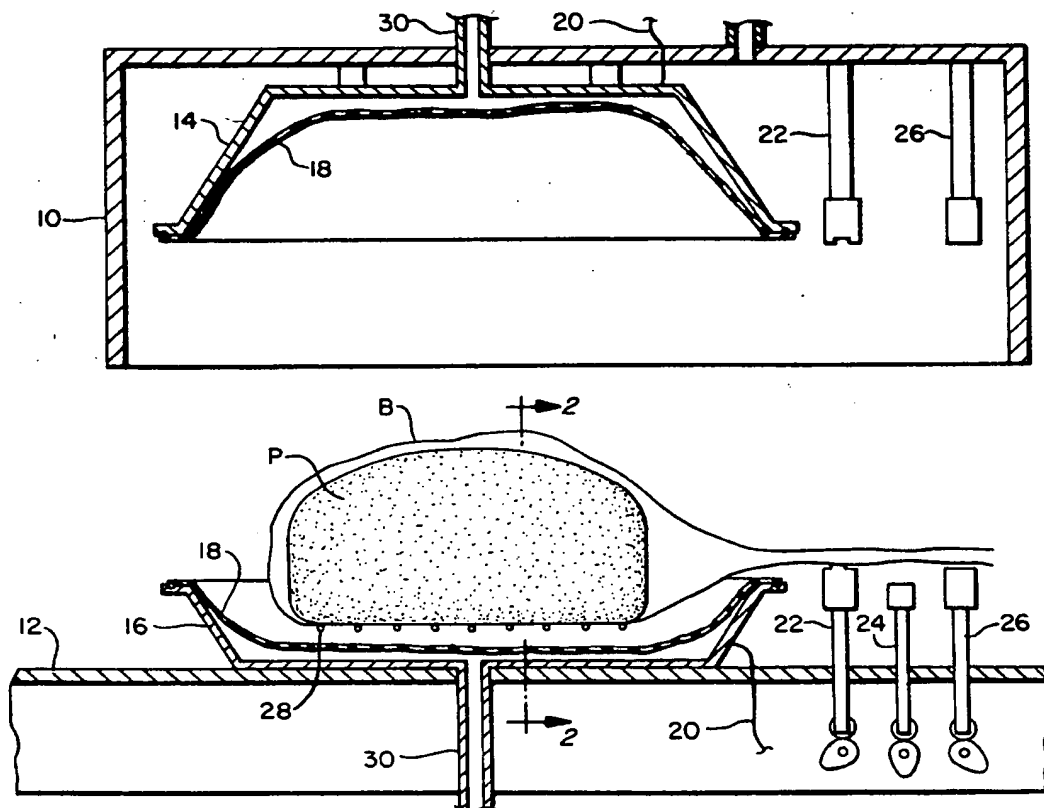


FIG. 2.

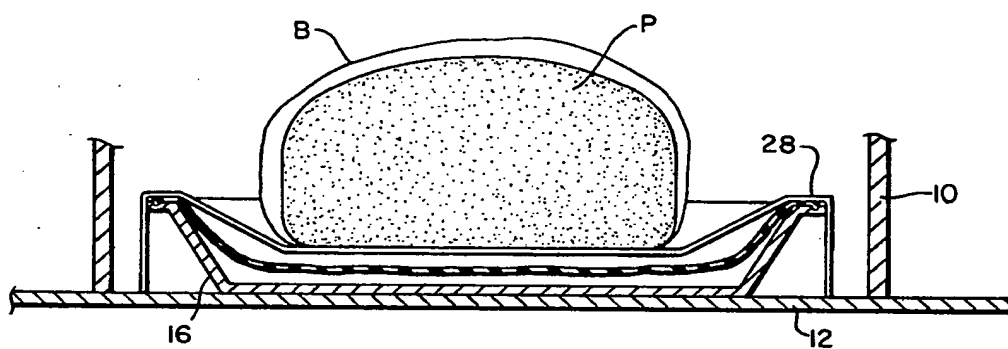


FIG. 4.

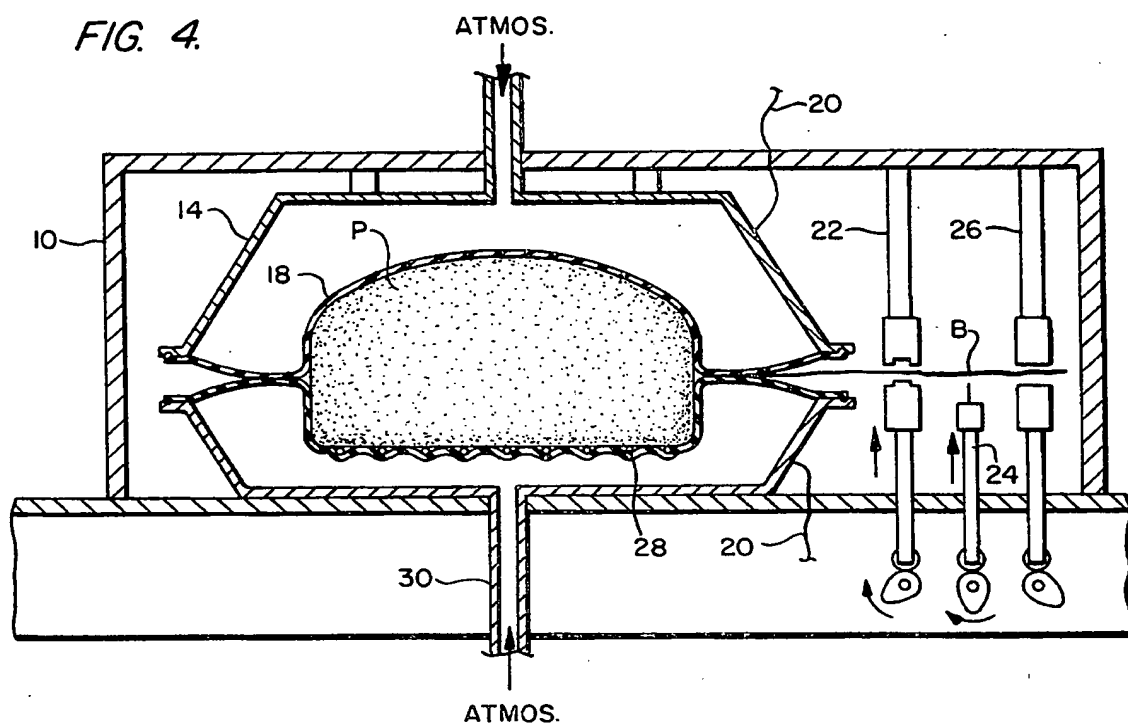
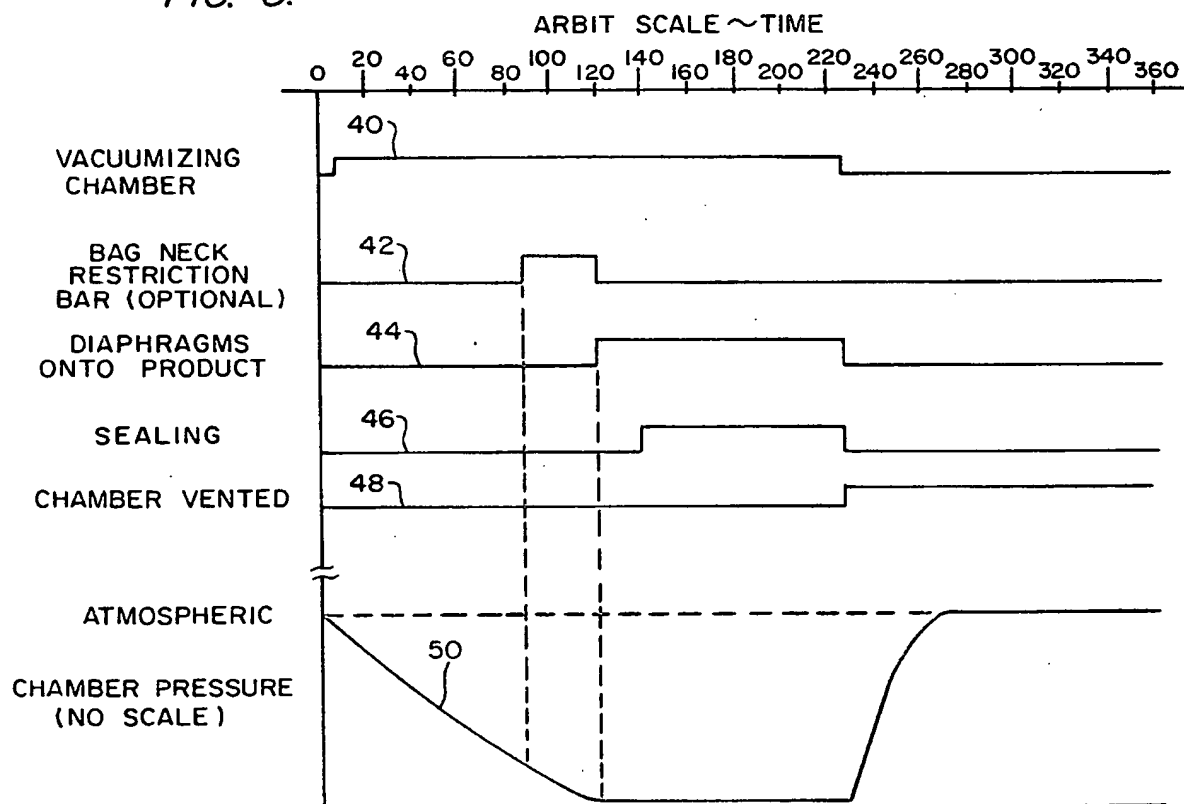


FIG. 5.



VACUUM PACKAGING GOODS IN HEAT SHRINKABLE PLASTIC BAGS USING FLEXIBLE DIAPHRAGMS

FIELD OF THE INVENTION

This invention relates to method and apparatus for packaging goods. Particularly, it pertains to vacuum packaging food in heat shrinkable plastic bags.

BACKGROUND

A patent, somewhat related to the present invention, is U.S. Pat. No. 4,132,048, which was issued to T. T. Day on Jan. 2, 1979. In the Day patent, which is owned by W. R. Grace & Co., the assignee of the present invention, the bag inside the chamber and the chamber are both evacuated to a relatively low reduced pressure, at which time the bag is sealed inside the chamber. Continued evacuation of the air in the chamber outside the bag caused the bag to balloon out due to residual air pressure therein, at which time it is heated by heaters on the inside of the chamber. The chamber is then vented in a controlled manner to aid in controlling the heat caused shrinkage of the bag onto the food product.

The Day apparatus and process operates well, but the present invention offers distinctions and additional advantages. Among these advantages are that the shrinking of the bag is controlled better. For example, as the bag is heated to a temperature at which the plastic of the bag material begins shrinking, the bag will commence shrinking regardless of whether or not that is the most opportune time with respect to the degree of evacuation of the surrounding chamber. In the present invention, the diaphragms control the start of shrinkage of the bag, and they are fully controllable.

Both the present invention and the apparatus of the above mentioned Day patent overcome numerous problems present in the prior art of hot water systems. It has been heretofore known to use pre-formed packaging such as bags for relatively large meat products such as whole rounds of beef or whole pork loins, but the art heretofore has been to shrink these bags using hot water. There are many disadvantages with hot water systems, including very poor utilization of the energy in the hot water (it has been estimated that as low as 3% of the heat energy in the water goes into the useful work of bag shrinkage, and the rest is wasted). In addition, handling of the hot water itself is a great problem since the work is done in meat packing cold rooms. These cold rooms consume enormous amounts of energy to keep them refrigerated and thus floor space is very valuable. The present invention is to a dry process, which saves all of the sloppiness and mess and safety hazards associated with water getting on the floor, and in addition it utilizes much less valuable floor space than is utilized by hot water systems.

An important advantage of the present invention resides in the provision of flexible diaphragms inside the heated platens inside the vacuum chamber. These diaphragms accomodate many difference sizes and shapes of goods, and deliver heat to all of them, as needed. The platens heat the diaphragms and the diaphragms deliver that heat to the heat shrinkable bag, and only to the bag by contact, which automatically accomodates difference sizes and shapes of products.

The invention also operates on a shorter time cycle because it does not need as low a vacuum pressure as

some prior art systems, and that achieves important advantages over the prior art.

Another advantage of the present invention's flexible heated diaphragms is that difference sizes and shapes of food products or other goods can be accommodated in one machine with no changes to the machine. In the real world of food packaging, it is unlikely that a plant which packages large cuts of beef would also package processed meat products such as salami or balogna. However, there are many different sizes and shapes of large cuts of beef and there are many different sizes of salami shaped products. Thus, the invention's heated flexible diaphragms produce important advantages over the prior art in general.

Another advantage of the invention is that when necessary a rack can be utilized in the chamber between the lower heated diaphragm and the meat product with the bag resting thereon. By controlling the size and the spacing of the wires or other material making up the rack, the amount of heat imparted to the product by the heated diaphragms can be controlled. This is important with certain products, such as certain cheeses and certain processed foods, wherein more than a predetermined small amount of heat would be unacceptable.

Another advantageous feature of the invention resides in an optional closing bar, which further improves the operation of the invention method by causing the bag to balloon out towards the diaphragms before the diaphragms contact the bag, to thus improve the shrink and the quality of the final package.

DESCRIPTION OF THE DRAWINGS

The above and other advantages of the invention will be pointed out or will become evident in the following detailed description and claims, and in the accompanying drawing also forming a part of the disclosure, in which:

FIGS. 1,3 and 4 are a series of views illustrating the method of the invention;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1 showing the manner of supporting the rack; and FIG. 5 is a timing chart showing the method.

SUMMARY OF THE INVENTION

In one aspect the invention is a method of vacuum packaging goods in heat shrinkable thermoplastic bags comprising the steps of loading a product into a heat shrinkable bag, contacting the bag with a flexible, heated diaphragm to shrink cause the bag to shrink and evacuating and sealing the bag. Evacuation can take place before, during or after the bag is contacted by the diaphragms.

In another aspect the present invention is a method of vacuum packing goods pre-loaded into a heat shrinkable bag comprising the steps of (a) providing diaphragm means which can be heated and which are operatively cooperable with said bagged goods, said diaphragm means being adapted to deliver heat to said bagged goods; (b) providing means to heat said diaphragm; (c) heating said diaphragm; (d) evacuating the air from inside said bag; (e) collapsing said diaphragm means onto said bagged goods to cause the heat in said diaphragm means to cause the bag to shrink onto said goods, and, (f) closing and sealing the bag.

In yet another aspect the present invention is a machine for vacuum packaging goods of the type wherein the goods are pre-loaded into heat shrinkable bags, said machine comprising a vacuum chamber to vacuumize

the bagged goods, the improvement comprising diaphragm means in said chamber of a size and shape sufficiently large to accommodate the largest goods to be packaged in the machine, heating means to heat said diaphragm means, means to control the motion of said diaphragm means with respect to said goods and the respective associated platen, and said diaphragm means consisting essentially of material adapted to transfer sufficient heat to the bagged goods to shrink the bag onto the goods.

DETAILED DESCRIPTION

Referring now in detail to the drawings, FIGS. 1 through 4 show apparatus comprising an outer vacuum chamber made up of a top 10 and a base 12. Other means not shown are provided to form air tight seals and the like as needed, all as is well known to those skilled in these arts. An upper platen 14 is mounted in the top 10, and a lower platen 16 is mounted on base 12. Mounting means, which may comprise yokes, nuts and bolts and the like, are provided to removably mount the platens 14 and 16, and these means also permit interchanging of the platens, as is also well known to those skilled in these arts.

By way of example, the drawings show a product "P" which has been pre-packaged into a bag "B" and has been put inside the chamber. A rack 28 is provided on which the product "P" rests. FIG. 2 shows how the rack simply rests on base 12 and is shaped to fit inside the lower platen 16. The rack is an optional feature, as explained below, and other sizes, shapes and types of racks can, of course, also be used.

The primary improvement of the invention resides in a pair of identical diaphragms 18, which are fixed to the lips of the upper and lower platens 14 and 16 as indicated in the drawings. Diaphragms are a well-developed art. A suitable flexible rubber or rubber-like material will be selected, based on its ability to withstand repeated flexing, contact with the food product and the rack 28, and its ability to transmit heat from the heated platens 14 and 16 to the food product. These are the main criteria in selecting the material for the diaphragms 18. As shown in the drawings, the upper diaphragm appears slightly larger than the lower, and the diaphragms can be the same or different, as a matter of design choice.

In addition to heating the diaphragms, means are provided to control their motion towards and away from the food product and to hold them in contact with the heated platens. To this end, conduits 30 extend to the upper and lower platens and are connected to a vacuum pump to withdraw the air from between each diaphragm and its platen. This pressure is called V_D . As is quite clearly apparent from the FIGS. 1 and 2, when V_D is applied, the diaphragms expand out into contact with the platens, as shown in FIG. 3. When this pressure is relieved, as indicated in FIG. 4, then the diaphragms collapse onto the product "P". Means are also provided for chamber vacuumization and pressure. Another pipe 32 is provided, and the vacuumizing pressure V_C is supplied to the system through this pipe 32.

As is well-known to those skilled in the art, the machine shown in the drawings can be associated with two separate vacuumizing systems, or with a single system having a three-way valve to direct the vacuum pressure to one, both, or neither of the two pipes 30 and 32. In any case, those skilled in this art know how to provide the vacuum pressures V_C and V_D to the pipes 30 and 32

respectively, in order to control the motion of the diaphragms and to vacuum-pack the product "P", as set forth in the method described below. FIG. 4 shows how the diaphragms are collapsed down onto the bagged product at the final step of the packaging, again as will be explained with respect to the method below.

The rack 28 will create an unheated section in the bag but will also control the heating of the food product "P" resting thereon. With, for example, cheese and certain other foods, heat must be very closely controlled or the product's esthetics or even its fitness as food can be adversely affected. The invention contemplates using racks of different sizes and shapes as needed to control the degree to which the food product is heated by contact with the heated lower diaphragm. For example, if the bars or other elements used to fabricate rack 28 were made thicker and/or positioned closer together, then the food product resting thereon would be heated less by the heat from the lower diaphragm. However, a concurrent disadvantage is that that portion of the bag on the rack is not heated as much as other portions of the bag. This will cause an irregularity in the manner in which the bag shrinks around the product, as is explained below, but which is not a serious problem. With many products, the rack can be omitted and the product put directly on the lower heated diaphragm.

It is anticipated that this problem can be overcome in a number of ways. Firstly, for certain products, this irregular area may not matter, i.e., products which have top and bottom surfaces. For example, if a quantity of chicken parts were to be shrink wrapped on a flat tray or the like, the underside of the tray or the like does not matter, and its contact with the rack and any resultant irregularity of the shrink has no effect. However, in some products this could make a difference, i.e., whole poultry. This problem can be overcome, as one possible solution, by providing a very large degree of shrink. That is, if the various parameters of the bag before and after shrinking are controlled such that the bag will have to shrink a great deal, then this large amount of shrinkage can literally "overpower" any possible irregularity created by the rack.

Thus, the advantage of controlling the heat imparted to the food so that no adverse effect is experienced by the food is obtained. Any problem of irregular shrink of the bag, if there is any, is overcome using other aspects of the teaching of the invention.

In general, the present invention provides an adequate package as to wrinkling and uniform fitting of the bag onto the goods, but, primarily, it solves problems in the prior art of limitations on the size of the goods relative to the chamber size which can be accommodated, i.e., it imparts great versatility as to sizes and shapes of goods which can be packaged in a single machine.

The bag may be made of any suitable packaging material including but not limited to thermal plastics such as polyethylene, cross-linked ethylene, polypropylene, saran, ethylene vinyl alcohol copolymers, nylon, polyvinyl fluoride, and the like, and laminates of these materials. Of course, other materials known to those skilled in the art can also be used.

It is conventional in this art to provide means inside the vacuum chamber to close, to seal, and to cut off excess bag material outboard of the seal. These means are well developed and generally well known, and are indicated herein by sealing means 22, cut-off means 24, and means 26 having the ability to close the bag in an air

tight manner, but not seal the bag, to later re-open the bag, and still later to permit sealing the bag using means 22.

Means, indicated by wire 20 connected to the two platens, are provided to heat the upper and lower platens 14 and 16. Heating of platens is known in this art, reference may be had to the Day patent referenced above as needed. Sufficient to say that the heating means deliver enough heat via the diaphragms to shrink the bag. The heat may be most conveniently supplied by electrical resistance means as is well known. While this is the preferred method of heating the platens which in turn heat the diaphragms, the platens, in an alternate embodiment could be eliminated and the diaphragms heated by an electrical resistance such as a mesh of flexible wires or strips.

The method of the invention comprises the following steps, which will be accompanied by references to the drawings as they appear in the sequence of steps.

In general, the method of the invention is to package products and bags smaller than the maximum capacity of the platens 14 and 16. The advantage resides in the fact that the bagged products can range from considerably smaller than, up to the full capacity of the maximum possible with any particular pair of platens 14 and 16. The diaphragms are preheated by being drawn out into contact with the platens, and then drawn in due to the vacuum conditions inside the machine in general onto the bagged product, to thus heat the bag and cause it to shrink down onto the product. An optional feature is that the clamp or seal bar 26 can be used to first balloon out the bag before the diaphragms come in onto it, to thus improve the manner in which the heated diaphragms cause the bag to shrink.

More in particular, the method steps are:

(1) The preloaded bag "B" with the product "P" is placed on the rack 28 in the open machine, with the mouth of the bag positioned over the closing sealing and cutting means 22, 24 and 26. This is shown in FIG. 1.

(2) The machine is closed onto the bag, and V_D is applied to draw the diaphragm 18 out into contact with the platens 14 and 16. (V_D may remain applied when the chamber is open, if desired. In the alternative, the platen heaters can remain heated.)

(3) The platen heaters are activated to begin heating.

(4) Vacuum pressure V_C is applied to the chamber 10-12 to evacuate the air from inside and outside the bag. This is shown in FIG. 2.

(5) As an option, while the evacuation by V_C is continuing, near the end of that cycle, the retaining or restriction bar 26 can be closed down onto the bag for a relatively short period of time to cause the bag to balloon out. This condition is shown in FIG. 5 on timing bar line 42. The scale 0 to 360 along the top of FIG. 5 is an arbitrary set of numbers to indicate relative interactions of the various events. The bag restriction bar is indicated by line 42, and the fact that it occurs during the vacuumizing of the chamber on the line 40 is evident.

(6) V_C evacuates the chamber and the bag to the same vacuum pressure. This can be momentarily, as is clear from FIG. 5 when the clamp bar option is used.

(7) The vacuum pressure V_D on the diaphragms is released or vented to atmosphere while the vacuum pressure in the chamber V_C continues. This causes collapse and shrinkage of the bag driven by the hot diaphragms onto the product, and is the condition shown

in FIG. 4. The rack 28 is, of course, between the diaphragm and the bag.

(8) The bag is then permanently sealed or clipped shut using means 22, and the excess bag material is cut off by means 24. (Preferably, final sealing occurs shortly after the chamber reaches the desired pressure). Clipping means are well known in this art, see U.S. Pat. No. 3,832,824 to Burrell assigned to the same assignee as the present invention, for example.

(9) V_C is turned off and the chamber vented to the atmosphere which causes an additional final tight collapse of the bag onto the product.

(10) The chamber is opened and package is removed.

The line 46 indicates the operation of the sealing means 22, and the line 50 shows the effect of V_C between atmosphere and the vacuumizing pressure, as indicated by line 50.

The word "platen" as used in the specification and claims herein shall be understood to include various sizes and shapes of such means useful in the invention and not be limited to flat devices as the word is sometimes defined in dictionaries.

While the invention has been described in detail above, it is to be understood that this detailed description is by way of example only, and the protection granted is to be limited only within the spirit of the invention and the scope of the following claims.

We claim:

1. A method of vacuum packing goods pre-loaded into a heat shrinkable bag and heat shrinking the bag comprising the steps of (a) providing flexible diaphragm means which can be heated and which are operatively co-operable with said bagged goods, said diaphragm means being adapted to deliver heat to said bag; (b) providing platen means substantially surrounding but defining a space larger than the bagged goods, said platen means including means to heat said diaphragm means; (c) heating said diaphragm out of contact with said bag by bringing said diaphragm means into contact with said platen means; (d) evacuating the air from inside said bag; (e) collapsing said heated diaphragm into contact with the bag to heat and to shrink the bag onto said goods; (f) and, closing and sealing the evacuated bag.

2. The method of claim 1 and the additional step of locating the bagged goods in a vacuum chamber to thereby evacuate the air from both inside and outside the bag, and temporarily closing the bag while performing said evacuating step to cause the bag to balloon out towards said diaphragm means prior to said step of collapsing said diaphragm means onto said bag.

3. The method of claim 1, and providing a predetermined size and shape of said platen means and of said diaphragm means adapted to cooperate with the maximum of the particular shape of the goods and of the bags being packed.

4. The method of claim 3, wherein the method is carried out by and in a vacuum packing machine, and selecting a removably mounted heated diaphragm and cooperative platen of a size and shape to permit packaging of different sizes and shapes of goods and of bags.

5. The method of claim 3, including the step of providing heated diaphragm means to support the goods thereon, whereby the amount of heat imparted to the goods from said heated diaphragm means can be controlled.

6. The method of claim 1, wherein said step of bringing said diaphragm in contact with said heated platen

means comprises means to permit evacuation of the space between said platen means and said diaphragm means.

7. The method of claim 1, wherein said step of closing and sealing the bag comprises the use of means to heat seal the bag.

8. In a machine for vacuum packaging goods of the type wherein the goods are pre-loaded into heat shrinkable bags, said machine comprising a vacuum chamber to vacuumize the bags, the improvement comprising: diaphragm means in said chamber of a size and shape sufficiently large to accommodate the largest goods to be packaged in the machine; platen means which include heating means to heat said platen and consequently heat said diaphragm means by contact therewith, said diaphragm means being substantially enclosed by said platen means and consisting essentially of material adapted to transfer sufficient heat to the bag to shrink it onto the goods; and, vacuum means to create alternate pressure differentials across said diaphragm whereby said diaphragm means can be drawn into contact with said platen means and then the thus heated diaphragm can be collapsed upon said bag.

9. The combination of claim 8, wherein said platens comprise upper and lower platens, and including rack means operatively cooperable with said lower platen to support the goods out of contact with said lower platen, said rack means being so configured as to control the heat from said diaphragm imparted to the goods resting on said rack means.

10. The combination of claim 8, including means to heat seal the bag in said vacuum chamber.

11. The combination of claim 8, including closure means in said chamber adapted to close but not seal said bag, whereby the bag may be caused to balloon out towards said heated diaphragm means to improve the shrink and fit of the bag onto the good in the resultant package.

12. The combination of claim 8, including means in said chamber to heat seal the bag.

13. The method of claim 1 wherein step (d) is performed before step (e).

14. The method of claim 1 wherein step (d) is performed after step (e).

15. The method of claim 1 wherein step (e) is performed while step (e) is being performed.

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9. Apparatus mounted on a vehicle for mixing a cementitious material in which a volatile liquid is employed comprising: an enclosed mixing chamber sealed to prevent the escape of the volatile liquid and any potentially dangerous fumes; a solid frame forming the top of said mixing chamber and having an inlet end thereof pivotally mounted on the vehicle; an easily removable elastomeric trough forming the bottom of said mixing chamber, the elastomeric material selected to be compatible with the materials being mixed; an auger having a central shaft and mounted in said frame to convey materials through said mixing chamber; mixing paddles mounted on the shaft of said auger; a drive motor for said auger mounted on said frame; a releasable flexible coupling between the aligned shafts of said motor and said auger to permit removal of said auger from said frame; an inlet hopper to introduce substantially dry materials into said mixing chamber; liquid injection means to introduce a liquid into said mixing chamber at a distance removed from said inlet hopper to have said substantially dry material form a plug to prevent the liquid and any fumes from backing up said inlet hopper; and a discharge opening formed in said elastomeric trough.

The references relied on by the examiner are:

Clemens	2,159,205	May 23, 1939
August	2,709,075	May 24, 1955
Tiemersma	3,199,145	Aug. 10, 1965
Cunningham	3,227,424	Jan. 4, 1966
Zimmerman	3,310,293	Mar. 21, 1967
Futty et al. (Futty)	3,339,898	Sep. 5, 1967
Wilkinson et al. (Wilkinson)	3,348,820	Oct. 24, 1967
Lasar	3,901,483	Aug. 26, 1975

Claims 9 through 14 and 17 stand rejected as being directed to obvious subject matter within the meaning of 35 U.S.C. 103 in light of the teachings of Zimmerman in view of Wilkinson, Futty, Lasar, Clemens and Cunningham. The examiner contends that Zimmerman discloses the claimed subject matter except for "having the mixing chamber enclosed with a solid top frame and having a removable auger and having liquid injection means and aligned shafts between the motor and auger and a discharge formed in the elastomeric trough," (final rejection, page 2, paper number 5). The examiner cites Wilkinson as disclosing an enclosed mixing chamber

where the enclosure comprises an inverted substantially U-shaped top frame portion and concludes that it therefore would be obvious to the artisan to modify the open frame in Zimmerman to be an enclosed mixing chamber as taught by Wilkinson "if desired." Since Wilkinson also discloses the concept of providing liquid injection means for the introduction of liquid into a mixing chamber remote from the inlet hopper, the examiner concludes that it would therefore be obvious to modify Zimmerman accordingly. Since Lasar discloses the concept of having an auger with mixing paddles mounted thereon wherein the auger is releasably coupled to a frame, the examiner concludes that it would have been obvious to the artisan to modify the auger in Zimmerman as taught by Lasar. Futty is cited to show that it is well known to provide coaxial alignment between an auger shaft and the shaft of a driving motor. Clemens is cited as disclosing the concept of having a discharge opening in a trough. The examiner concludes that it would have been obvious in light of Futty and Clemens to modify the auger/motor alignment and discharge opening of Zimmerman to be of the nature suggested by Futty and Clemens. Cunningham is cited as disclosing seal means to preclude leakage of the material within the mixing chamber. The examiner concludes that it would have been obvious in light of the teachings of Cunningham to employ seal means on the modified device of Zimmerman. Claim 15 stands rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and August. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been further obvious to the artisan in light of the teachings of August to provide spray elements with selectively activated controls since August teaches such devices to be known.

Claims 16, 18 and 19 stand rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and Tiemersma. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been obvious to further modify the structure of Zimmerman to include a gas-filled bearing housing for sealing purposes.

Rather than reiterate the arguments of appellant and the examiner, reference is made to the brief and answer for the respective details thereof.

**Patent and Trademark Office
Board of Patent Appeals and
Interferences**

Ex parte Clapp

Opinion dated Feb. 28, 1985

ATTENTS

**Anticipation — Combining references
(§51.205)**

To support conclusion that claimed combination is directed to obvious subject matter, references must either expressly or impliedly suggest claimed combination or examiner must present convincing line of reasoning as to why artisan would have found claimed invention to have been obvious in light of references' teachings.

Application for patent of Thomas R. Clapp, Serial No. 257,162, filed Apr. 24, 1981. From rejection of Claim 9-19, applicant appeals Appeal No. 553-54). Reversed.

Donner W. Walters, for appellant.

Before Bennett, Henon and Spencer, Examiners-in-Chief.

Henon, Examiner-in-Chief.

This appeal is from the decision of the examiner rejecting claims 9 through 19, which constitute all the claims remaining in the application.

The invention relates to an auger type mixing apparatus for mixing cementitious materials employing a volatile liquid. Representative claim 9 reads as follows:

where the enclosure comprises an inverted substantially U-shaped top frame portion and concludes that it therefore would be obvious to the artisan to modify the open frame in Zimmerman to be an enclosed mixing chamber as taught by Wilkinson "if desired." Since Wilkinson also discloses the concept of providing liquid injection means for the introduction of liquid into a mixing chamber remote from the inlet hopper, the examiner concludes that it would therefore be obvious to modify Zimmerman accordingly. Since Lasar discloses the concept of having an auger with mixing paddles mounted thereon wherein the auger is releasably coupled to a frame, the examiner concludes that it would have been obvious to the artisan to modify the auger in Zimmerman as taught by Lasar. Futty is cited to show that it is well known to provide coaxial alignment between an auger shaft and the shaft of a driving motor. Clemens is cited as disclosing the concept of having a discharge opening in a trough. The examiner concludes that it would have been obvious in light of Futty and Clemens to modify the auger/motor alignment and discharge opening of Zimmerman to be of the nature suggested by Futty and Clemens. Cunningham is cited as disclosing seal means to preclude leakage of the material within the mixing chamber. The examiner concludes that it would have been obvious in light of the teachings of Cunningham to employ seal means on the modified device of Zimmerman. Claim 15 stands rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and August. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been further obvious to the artisan in light of the teachings of August to provide spray elements with selectively activated controls since August teaches such devices to be known.

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Claims 16, 18 and 19 stand rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and Tiemersma. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been obvious to further modify the structure of Zimmerman to include a gas-filled bearing housing for sealing purposes.

Rather than reiterate the arguments of appellant and the examiner, reference is made to the brief and answer for the respective details thereof.

where the enclosure comprises an inverted substantially U-shaped top frame portion and concludes that it therefore would be obvious to the artisan to modify the open frame in Zimmerman to be an enclosed mixing chamber as taught by Wilkinson "if desired." Since Wilkinson also discloses the concept of providing liquid injection means for the introduction of liquid into a mixing chamber remote from the inlet hopper, the examiner concludes that it would therefore be obvious to modify Zimmerman accordingly. Since Lasar discloses the concept of having an auger with mixing paddles mounted thereon wherein the auger is releasably coupled to a frame, the examiner concludes that it would have been obvious to the artisan to modify the auger in Zimmerman as taught by Lasar. Futty is cited to show that it is well known to provide coaxial alignment between an auger shaft and the shaft of a driving motor. Clemens is cited as disclosing the concept of having a discharge opening in a trough. The examiner concludes that it would have been obvious in light of Futty and Clemens to modify the auger/motor alignment and discharge opening of Zimmerman to be of the nature suggested by Futty and Clemens. Cunningham is cited as disclosing seal means to preclude leakage of the material within the mixing chamber. The examiner concludes that it would have been obvious in light of the teachings of Cunningham to employ seal means on the modified device of Zimmerman. Claim 15 stands rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and August. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been further obvious to the artisan in light of the teachings of August to provide spray elements with selectively activated controls since August teaches such devices to be known.

Claims 16, 18 and 19 stand rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and Tiemersma. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been obvious to further modify the structure of Zimmerman to include a gas-filled bearing housing for sealing purposes.

Rather than reiterate the arguments of appellant and the examiner, reference is made to the brief and answer for the respective details thereof.

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We will not sustain any of the rejections.

[1] Presuming arguendo that the references show the elements or concepts urged by the examiner, the examiner has presented no line of reasoning, and we know of none, as to why the artisan viewing only the collective teachings of the references would have found it obvious to selectively pick and choose various elements and/or concepts from the several references relied on to arrive at the claimed invention. In the instant application, the examiner has done little more than cite references to show that one or more elements or subcombinations thereof, when each is viewed in a vacuum, is known. The claimed invention, however, is clearly directed to a combination of elements. That is to say, appellant does not claim that he has invented one or more elements but has presented claims to a new combination of elements. To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. We find nothing in the references that would expressly or impliedly teach or suggest the modifications urged by the examiner. Additionally, as aforementioned, we find no line of reasoning in the answer, and we know of none, as to why the artisan would have found the modifications urged by the examiner to have been obvious. Based upon the record before us, we are convinced that the artisan would not have found it obvious to selectively pick and choose elements or concepts from the various references to arrive at the claimed invention without doing the claims as a guide. It is to be noted that the claims and hindsight are not proper criteria for resolving the issue of obviousness. Note In re Horn, 203 USPQ 969, 971 (CCPA 1979). Accordingly, we will not sustain any of the rejections presented.

The decision of the examiner rejecting claims 9 through 19 as being directed to obvious subject matter within the meaning of 35 U.S.C. 103 is reversed.

District Court, E. D. Pennsylvania

Allen Organ Company v. ELKA S.p.A.

No. 85-90

TRINTEC INDUSTRIES, INC., Plaintiff-Appellant, v. TOP-U.S.A. CORPORATION, Defendant-Appellee.

01-1568

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

295 F.3d 1292; 2002 U.S. App. LEXIS 13190; 63 U.S.P.Q.2D (BNA) 1597

July 2, 2002, Decided

PRIOR HISTORY: [****1**] Appealed from: United States District Court for the Southern District of Ohio Senior Judge Joseph P. Kinneary.

DISPOSITION-1: Vacated and remanded.

CASE SUMMARY

PROCEDURAL POSTURE: Plaintiff patent assignee sued defendant company alleging infringement. The United States District Court for the Southern District of Ohio granted summary judgment in favor of the company on the grounds the patent was invalid as inherently anticipated. The patent assignee appealed.

OVERVIEW: The patent claimed a cost-effective method of producing, in low volume, multicolor faces for watches, clocks, thermometers and other instruments. The method included making a graphic instrument face in a computer, transmitting electronic signals from the computer to a color printer or photocopier, printing the face on sheet material, cutting it, and assembling it into an instrument. The company produced watches and clocks with customized faces. The company used color laser printers to make custom watches and clocks. A different manufacturer also was in the business of customized watches and advertised in a catalogue the availability at an inexpensive price of small-volume multi-color watches produced by a new computer laser printer. The district court found that the catalogue inherently anticipated the asserted claims and granted summary judgment of invalidity. The court of appeals held that given the strict identity required of the test for novelty, on the record no reasonable jury could conclude that the catalogue anticipated either expressly or inherently the claim at issue. Because the record was not fully developed the issue of obviousness could not be reached.

OUTCOME: The judgment was vacated and the matter was remanded for a determination on the issue of obviousness and other proceedings consistent with the opinion.

COUNSEL: Robert A. Vanderhye, Nixon & Vanderhye P.C., of Arlington, Virginia, argued for plaintiff-appellant.

David P. Shouvin, Porter, Wright, Morris, & Arthur, LLP, of Columbus, Ohio, argued for defendant-appellee. On the brief was David W. Costello. Of counsel was Richard M. Mescher.

JUDGES: Before MAYER, Chief Judge, RADER, and GAJARSA Circuit Judges.

OPINIONBY: RADER

OPINION: [***1293**] Before MAYER, Chief Judge, RADER, and GAJARSA Circuit Judges.

RADER, Circuit Judge.

On summary judgment, the United States District Court for the Southern District of Ohio found Trintec Industries, Inc.'s United States Patent No. 5,818,717 ('717 patent) invalid as inherently anticipated. Trintec, Indus. v. Top-U.S.A. Corp., No. C-2-99-1179 (S.D. Ohio Jun. 19, 2001). Because the '717 patent is not inherently anticipated, this court vacates and remands.

I.

Trintec is the assignee of the '717 patent. The inventor, Brendon G. Nunes, [***1294**] filed the '717 patent application on June 2, 1993. The '717 patent claims a cost-effective method of producing, in low volume, multicolor faces for watches, clocks, [****2**] thermometers and other instruments. The method includes making a graphic instrument face in a computer, transmitting electronic signals from the computer to a color printer or photocopier, printing the face on sheet material, cutting it, and assembling it into an instrument.

Top-U.S.A. Corporation produces watches and clocks with customized faces, and has done so for over eighteen years. Initially, Top created and printed its customized graphics using pad printing, engraving, silk screening, or photography. Those methods were expensive and required extensive set-up time. Thus, these older methods were ill-suited to small-volume custom design and printing. Desktop publishing's advent in the late 1980s mitigated the design side of

this problem, but high-resolution color printing remained prohibitively expensive. With color laser printer advances, however, Top was using that technology to make custom watches and clocks by 1995.

Sweda Company LLC also is in the customized watch business. In a 1991-92 catalogue (Sweda catalogue), Sweda advertised the availability at an inexpensive price of small-volume multi-color watches produced by "a new computer laser printer." The Sweda catalogue [**3] was not before the examiner of the '717 patent during its prosecution.

On November 2, 1999, Trintec asserted the '717 patent against Top in the district court. Trintec alleged that Top infringed independent claims 3 and 8, and associated dependent claims 4-5, 12, and 13. Trintec filed a motion for summary judgment of infringement, intentional infringement, and validity. Top filed a cross-motion for summary judgment that the asserted claims either were anticipated or obvious in view of the Sweda catalogue. The district court found that the Sweda catalogue inherently anticipated the asserted claims and granted summary judgment of invalidity. Having determined that prior art anticipated the '717 patent, the district court did not reach obviousness and dismissed the case with prejudice. Trintec appeals the district court's summary judgment of invalidity. This court has jurisdiction under 28 U.S.C. § 1295(a)(1) (2000).

II.

This court reviews a district court's grant of summary judgment without deference. Johns Hopkins Univ. v. Cellpro, Inc., 152 F.3d 1342, 1353, 47 U.S.P.Q.2D (BNA) 1705, 1713 (Fed. Cir. 1998). This court also reviews without deference questions [**4] of claim construction. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454, 46 U.S.P.Q.2D (BNA) 1169, 1174 (Fed. Cir. 1998) (en banc). Novelty, or anticipation, is a question of fact. Akzo N.V. v. United States Int'l Trade Comm'n, 808 F.2d 1471, 1 U.S.P.Q.2D (BNA) 1241 (Fed. Cir. 1986). Therefore, a district court properly may grant summary judgment on this identity question only when the record discloses no genuine material factual issues.

Because novelty's identity requirement applies to claims, not specifications, Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 7 U.S.P.Q.2D (BNA) 1057, 1064 (Fed. Cir. 1988), the anticipation inquiry first demands a proper claim construction. Claim language defines claim scope. SRI Int'l v. Matsushita Elec. Corp., 775 F.2d 1107, 1121, 227 U.S.P.Q. (BNA) 577, 586 (Fed. Cir. 1985) (en banc). As a general rule, claim language carries the ordinary

meaning of the words in their normal usage in the field of invention. Toro Co. v. White Consol. Indus., 199 F.3d 1295, 1299, 53 U.S.P.Q.2D (BNA) 1065, 1067 (Fed. Cir. 1999). Nevertheless, [**1295] the inventor may act as his own lexicographer and use the specification [**5] to supply implicitly or explicitly new meanings for terms. Markman v. Westview Instruments, Inc., 52 F.3d 967, 979-80, 34 U.S.P.Q.2D (BNA) 1321, 1330 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370, 134 L. Ed. 2d 577, 116 S. Ct. 1384 (1996). Thus, a construing court may consult as well the written description, and, if in evidence, the prosecution history. *Id.*

A single prior art reference anticipates a patent claim if it expressly or inherently describes each and every limitation set forth in the patent claim. Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628, 631, 2 U.S.P.Q.2D (BNA) 1051, 1053 (Fed. Cir. 1987). Inherent anticipation requires that the missing descriptive material is "necessarily present," not merely probably or possibly present, in the prior art. In re Robertson, 169 F.3d 743, 745, 49 U.S.P.Q.2D (BNA) 1949, 1950-51 (Fed. Cir. 1999) (citing Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264, 1268, 20 U.S.P.Q.2D (BNA) 1746, 1749 (Fed. Cir. 1991)).

In this case, the district court determined that the Sweda catalogue anticipated, or disclosed and enabled each and every element of, the claimed invention. [**6] The Sweda catalogue advertises three different methods of making customized watches: a "full color watch rendering" method, a "mock-up sample" method, and a "speculative sample" method. The catalogue states that the first two methods use a computer laser printer, and the "speculative samples" method uses silk-screening, hot stamping, color process/offset printing, etchograph stamping, or engraving. The catalogue then shows images of color watch faces made with each of the advertised methods. All three methods require the customer to submit "camera ready, color separated artwork," i.e., separate pieces of black and white artwork representing each color in the design.

Top concedes that the Sweda catalogue does not teach expressly all limitations of the asserted claims. Hence, the only issue for this court to determine is whether the claim limitations not taught expressly by the Sweda catalogue are nevertheless disclosed inherently. This inherent anticipation question implicates claims 3 and 8. Claim 3 recites, in relevant part:

3. A method of constructing a functional multicolor element having indicia thereon, utilizing a computer and a color

photocopier, comprising the steps [**7] of:

(a) electronically creating or providing in the computer an electronic simulation of the desired functional multicolor element, with indicia thereon;

(b) under the control of the computer, transmitting electronic signals from the computer to the photocopier so that the photocopier transforms the electronic simulation of the desired functional multicolor element onto a piece of sheet material

Col. 7, ll. 16-26 (emphases added).

The district court construed the term "color photocopier" to mean a "color printer." The district court noted that the Sweda catalogue expressly advertises: "A color picture of your customers custom logo produced by our new advanced computer laser printer." Based on this, the district court determined that the Sweda catalogue inherently disclosed a color printer because "those in the graphic arts industry would have recognized that a color printing device is necessarily present in the catalogue's description of 'a full color rendering' produced from a 'computer laser printer.'" Nevertheless, a color printer is not a color photocopier.

The '717 patent specification teaches that a "major component" of the invention [*1296] "is a printer, [**8] preferably a color photocopier." Col. 3, ll. 62-64. At the same time, the patent also recognizes that a color photocopier does more than print in color -- it copies. Specifically, the specification teaches "photocopying with a color photocopier, such as of the types earlier described." Col. 6, ll. 20-21. The undisputed trial testimony of Dr. Steven J. Bares underscores this point: "Digital color copiers comprise a digital color scanner and a digital color laser printer which are directly connected together so that graphics transformed into digital information through the scanner are transmitted to the digital color laser printer for printing." As a matter of correct claim construction, therefore, a "color photocopier" requires the ability both to print and photocopy subject matter with color.

The difference between a printer and a photocopier may be minimal and obvious to those of skill in this art. Nevertheless, obviousness is not inherent anticipation. Jones v. Hardy, 727 F.2d 1524, 1529, 220 U.S.P.Q. (BNA) 1021, 1025 (Fed. Cir. 1984) ("though anticipation is the epitome of obviousness, [they] are separate and distinct concepts"). Given the strict identity required of the [**9] test for novelty, on this record no reasonable jury could conclude that the

Sweda catalogue discloses either expressly or inherently a color photocopier. Because claim 3 is not inherently anticipated, dependent claims 4 and 5 also are not anticipated.

Claim 8 recites, in relevant part:

8. A method of producing an instrument face having functional indicia thereon, utilizing a computer and printer, comprising the steps of:

(a) creating the instrument face with functional indicia thereon in the computer in electronic format

Col. 8, ll. 1-5 (emphases added). While claim 3 has the broader language "creating or providing," claim 8 recites only "creating." Nonetheless, the district court interpreted both claims to require "creating or providing in a computer a multicolor logo and hour markings to comprise the face of an instrument." (Emphasis added.) The district court found that the Sweda catalogue inherently anticipated "creating or providing" as required by its claim construction. Because claim 8 requires "creating" rather than "creating or providing," the district court erred in its construction of that claim and in its corresponding determination [**10] of inherent anticipation.

The '717 patent does not define expressly "creating" or "providing." The two terms, however, have distinct meanings. Each term appears in claim language. Each therefore imparts a different scope to the claim in which it appears. See, e.g., Unique Concepts, Inc. v. Brown, 939 F.2d 1558, 1562, 19 U.S.P.Q.2D (BNA) 1500, 1503 (Fed. Cir. 1991) ("The fact that mitered linear border pieces meet to form a right angle corner does not make them right angle corner pieces, when the claim separately recites both linear border pieces and right angle corner border pieces.").

In its teachings, the specification treats the two terms differently. For example, with respect to preparing an instrument face for printing, the specification describes a two step process: "The artwork . . . is created in electronic format in the computer. Information may initially be inputted into the computer for this purpose from a conventional scanner or a CD ROM." Col. 4, ll. 7-11 (emphasis added). In sum, the patent recognizes that information may be provided (input) into the computer after creation elsewhere or, alternatively, may be created in the computer from scratch. Regarding [**11] the creating step, the specification further teaches that "commercially available software programs" may be used to "produce almost [*1297] any design desired on an instrument face." Col. 4, ll. 11-14, 18. In view of these teachings, this court construes "creating" to require more than simply using the computer as a conduit to convey information to the

printer from a scanner or a CD ROM. Creating requires, rather, a substantive addition or modification of the artwork in the computer, such as when graphics software adds a design to an instrument face.

The Sweda catalogue discloses, as discussed above, various printing methods. These printing methods disclose nothing about creating artwork in a computer. For this reason, the Sweda catalogue does not inherently anticipate claim 8. Specifically, the Sweda catalogue may well have created instrument faces with conventional manual methods. Then after manual creation or assembly, the Sweda catalogue may have provided those faces to a computer only for printing. Indeed, the Sweda catalogue required expressly that its customers provide color separations of their artwork. The record suggests that those of skill in this art use color separations to create **[**12]** manually a composite color rendering of the desired image. Then a black and white laser printer makes separate transparent color sheets based on the color separations. Finally, the artisans overlay the separate color sheets manually to form a composite color rendering of the desired image. This process requires no substantive addition or modification of the artwork in the computer -- as mandated by a correct reading of the term "create." In other words, the process suggested by the Sweda catalogue combines the color sheets outside of the computer, with the computer serving merely as a conduit for printing. It is irrelevant that a skilled artisan might possibly use the computer to create the final desired image from the color separations. Inherency does not embrace probabilities or possibilities. In re Robertson, 169 F.3d 743, 745, 49 U.S.P.Q.2D (BNA) 1949, 1951 (Fed. Cir. 1999). In sum, no reasonable jury could find that the Sweda catalogue anticipates either expressly or inherently this claim.

Cases involving novelty, with its strict identity requirement, are quite rare. Obviousness seems the actual issue here. This court, however, cannot reach that question without a fully **[**13]** developed record. Obviousness involves, for instance, questions of suggestion to combine, see, e.g., In re Rouffet, 149 F.3d 1350, 47 U.S.P.Q.2D (BNA) 1453 (Fed. Cir. 1998), and objective indicators of patentability, see, e.g., Graham v. John Deere Co., 383 U.S. 1, 17-18, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966). On appeal, this court cannot venture into these factual and complex areas without a developed record. Accordingly, this record requires remand to permit the trial court to apply the obviousness standards in light of the Sweda catalogue and other prior art as viewed with the knowledge of one of skill in the art at the time of invention.

CONCLUSION

Because the district court erred in granting summary judgment that claims 3-5, 8, 12, and 13 are inherently anticipated, this court vacates and remands for a determination on the issue of obviousness and other proceedings consistent with this opinion.

COSTS

Each party shall bear its own costs.

VACATED AND REMANDED

IN RE TSUTOMU HARUNA and SADAOKITA

00-1283

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

249 F.3d 1327; 2001 U.S. App. LEXIS 7162; 58 U.S.P.Q.2D (BNA) 1517

April 18, 2001, Decided

PRIOR HISTORY: [**1] Appealed from: Patent and Trademark Office Board of Patent Appeals and Interferences. (Serial No. 29/058,031).

DISPOSITION-1: REVERSED.

CASE SUMMARY

PROCEDURAL POSTURE: Appellants challenged the decision of the United States Board of Patent Appeals and Interferences which upheld the examiner's rejection of the claim in a design patent as being unpatentable.

OVERVIEW: Appellants claimed that the design patent application was directed to an ornamental design for a pre-recorded optical disk. The design differed from conventional pre-recorded optical disks in that the metallized region of the disk stopped well short of the outer rim, and the disk had a relatively wide transparent region adjacent the outer rim. The examiner rejected the patent application as being obvious under 103 in view of Benne, a utility patent directed to disk-shaped information carriers, such as video laser discs and digital audio discs. The board concluded that the fact that the outer region of appellants' disc was transparent where the outer region of the Benne's disks were colored did not amount to a patentable difference. The court found that Benne taught away from a final product having a broad transparent outer region, and therefore the claimed design was not rendered obvious. The board's failure to apply the ultimate test for obviousness whether the overall appearance and visual effect of the claimed design was obvious in view of the prior art was fatal to its analysis. The board therefore erred as a matter of law.

OUTCOME: The board's decision was reversed.

COUNSEL: Andrew J. Patch, Young & Thompson, of Arlington, Virginia, argued for appellants.

Joseph G. Piccolo, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for appellee, Director of the United States Patent and Trademark Office. With him on the brief were John M. Whealan,

Solicitor; and Sydney O. Johnson, Jr., Associate Solicitor.

JUDGES: Before SCHALL, Circuit Judge, FRIEDMAN, Senior Circuit Judge, and GAJARSA, Circuit Judge.

OPINIONBY: SCHALL

OPINION: [**1329] SCHALL, Circuit Judge.

Tsutomu Haruna and Sado Kita (collectively, "Haruna") appeal the decision of the United States Board of Patent Appeals and Interferences ("Board") that upheld the examiner's rejection of the sole claim in design patent application serial number 29/058,031 (the "'031 application"). In re Haruna, No. 1999-2020 (Bd. Pat. App. & Int. Dec. 20, 1999). The Board affirmed the examiner's rejection of the claim as being unpatentable under 35 U.S.C. 103 because it is rendered obvious by U.S. Patent No. 4,747,093 to Benne et al. ("Benne"). Because Benne [**2] teaches away from the design claimed in the '031 application, we reverse the decision of the Board.

BACKGROUND

The sole claim of the '031 application is directed to an "ornamental design for a pre-recorded optical disk." The design differs from conventional pre-recorded optical disks in that the metallized region of the disk stops well short of the outer rim, and the disk has a relatively wide transparent region adjacent the outer rim.

The pen and ink and photographic versions of Figure 1 of the application are set forth below:

[**1330] [SEE FIGURE 1 ILLUSTRATION IN ORIGINAL]

[**1331] [SEE FIGURE 1 PHOTOGRAPHIC FIGURE IN ORIGINAL]

As seen in the photographic figure, the outer ring of the disk is transparent, while the adjacent inner ring is metallized and may bear printing.

During prosecution, the examiner rejected the '031 application as being obvious under 103 in view of Benne. Benne is a utility patent directed to disk-shaped information carriers, such as video laser discs and digital audio discs. Benne, column 1, lines 9-11. Benne describes its disks as having at least three zones: (1) outer zone A; (2) center zone B; and (3) inner zone C. Id. at column 5, lines 8-12. Center zone B is metallized and contains the information recorded on the disk. Id. at column 5, lines 14-21. Outer zone A does not contain recorded information and may or may not be metallized. Id. at column 3, lines 56-57; column 5, lines 49-50. According to the patent, this zone can be relatively large. Id. at column 2, line 26. Figure 1 of Benne illustrates the basic configuration of the Benne disks:

[*1332] [SEE FIGURE 1 ILLUSTRATION IN ORIGINAL]

Zones A/B and B/C separate zones A, B, and C. Id. at column 5, lines 10-11. Reference letter M is not identified in the patent, but appears to identify the center hole of the disk. See, e.g., id. at column 5, line 13.

The object of the Benne invention is to manufacture disks in such a way as to conceal any cosmetic defects in outer zone A. Id. at column 2, lines 23-27. The invention achieves this goal "by treating a surface of the outer zone . . . so that . . . the [disk] reflects any light falling in the outer zone at least partially diffusely and/or absorbs it at least partly, so that optical effects . . . which could adversely influence the appearance of the [disk] are at least partially masked or concealed." Id. at column 2, lines 39-49. The [*4] patent teaches that "concealment of the defects may be achieved by providing the outer zone . . . on its readout and/or back sides with a matt [sic] finish, printing, and/or one or more stick-on labels." Id. at column 3, lines 31-34. According to the patent, when outer zone A is not metallized, "the matt [sic] finish is then also visible from the readout side and can . . . be used . . . as a background for printing applied to the outer zone on the readout side." Id. at column 3, lines 61-68. When the disk is fully metallized, "both the back and the readout side may be given a matt [sic] finish, be partially printed or provided with at least one stick-on label in the outer zone." Id. at column 4, lines 1-4. The patent also teaches the use of combinations of the disclosed concealing measures. Id. at column 4, lines 4-5. The teachings at column 8 of Benne provide further examples of decoration using "matt-printed [sic] parts, reflecting parts, and printed parts of any required color" in accordance with the invention. Id. at column 8, lines 54-68. Figure 2 of Benne illustrates

"different possible combinations of the concealment measures." Id. at column 5, lines 41-42. In this figure, [*5] the outer zone is labeled as A1-A4, the inner zone is labeled as B1-B4, and the center zone is not labeled:

[*1333] [SEE FIGURE 2 ILLUSTRATION IN ORIGINAL]

In rejecting the '031 application over Benne, the examiner asserted that the characteristics of the claimed design were basically the same as those of the Benne disks. The examiner determined that the difference between the disk claimed in the application and the disks disclosed in Benne the transparency of the wide outer region did not lend patentability to the design. The examiner stated that the clarity and openness of the claimed design was obvious and expected from the conventional transparent material used as the substrate for the disk, and that the claimed design required no exercise of inventive faculty in either conception or execution. The examiner asserted that the teachings in Benne regarding an embodiment wherein outer zone A is not metallized, id. at column 3, lines 61-63, and an embodiment where color printing on one side of the outer zone can be seen from the other side, id. at column 5, lines 61-62, suggest a disk with a transparent outer region.

Haruna appealed the rejection of the '031 application to the Board. The [*6] Board sustained the obviousness rejection, citing the appearance of conventional disks and the teachings of Benne. The Board noted that conventional disks have "a relatively narrow, approximately three millimeter, extreme outer . . . region . . . [that is] unmetallized and transparent." Haruna, slip op. at 3. The Board determined that the only difference between the claimed design and the design of the disks disclosed in Benne is that the claimed design has a transparent outer region, whereas Benne teaches that the outer zone of its disks has "a matte finish or some other light-diffusing or light-absorbing imprint." Haruna, slip op. at 5. The Board noted that Benne teaches that the printed material of its disks may be of "any required color," id. (citing Benne, column 8, lines 54-68), and cited In re Cohn, 23 C.C.P.A. 766, 80 F.2d 65, 27 U.S.P.Q. (BNA) 412 (CCPA 1935), for the proposition that transparency is legally considered to be a color. Haruna, slip op. at 6.

The design at issue in Cohn was a cellulosic ribbon with a transparent center portion and edges that were a different color than the center portion. Cohn, 80 F.2d at 66, 27 U.S.P.Q. (BNA) at 412. The prior art was [*7] a design for a shoe strap consisting of "a strap with black marginal stripes and an intervening light stripe." Id., 27 U.S.P.Q. (BNA) at 413. The court determined that "alternating stripes of color, arranged

as they are [in the claimed design], are sufficiently shown by the references." *Id.* The court stated that "the fact that the design here [*1334] presented shows a transparent portion rather than a stripe of different color . . . creates no patentable novelty in the design." *Id.* Cohn also sets forth the proposition that "it cannot be successfully argued that patentability of a design may rest on color alone." 80 F.2d at 65, 27 U.S.P.Q. (BNA) at 413.

The Board noted that *In re Iknayan*, 47 C.C.P.A. 789, 274 F.2d 943, 124 U.S.P.Q. (BNA) 507 (CCPA 1960), applied the principles set forth in *Cohn*. The design at issue in *Iknayan* was a tire with a sidewall having a portion that was white adjacent a portion that was chromatic. 274 F.2d at 943, 124 U.S.P.Q. (BNA) at 508. The prior art included tires having sidewalls with white portions adjacent colored portions. *Id.* at 943-44, 124 U.S.P.Q. (BNA) at 508. The court determined that "the general appearance of appellants' tire is quite similar to that of [the prior art]," and that [**8] "selection of a chromatic color to replace the dark color shown in the [prior art] would not produce any basic alteration or unexpected appearance." *Id.* at 944, 124 U.S.P.Q. (BNA) at 509.

The Board concluded from *Cohn* and *Iknayan* that the fact that the outer region of *Haruna's* disk is transparent where the outer region of *Benne's* disks are colored does not amount to a patentable difference. *Haruna*, slip op. at 6. *Haruna* appeals the Board decision. We have jurisdiction pursuant to 28 U.S.C. 1295(a)(4)(A).

DISCUSSION

Obviousness under 103 is a question of law based on underlying findings of fact. *In re Gartside*, 203 F.3d 1305, 1316, 53 U.S.P.Q.2D (BNA) 1769, 1776 (Fed. Cir. 2000). We review the Board's factual findings for substantial evidence, and its legal conclusion of obviousness without deference. *Id.* at 1315, 53 U.S.P.Q.2D (BNA) at 1775-76.

Haruna argues that the decision of the Board should be reversed because *Benne* does not disclose or suggest a disk that looks like the claimed design. *Haruna* argues that the claimed design is antithetical to the teachings of *Benne* because *Benne* is directed to concealing defects in the outer region by covering up the outer [**9] region with a matte finish, printing, or labels, whereas the claimed design includes a transparent outer region in which any defects would not be concealed. *Haruna* argues that the patentability of the claimed design lies in the combination of the shape of the claimed article and its surface ornamentation. *Haruna* acknowledges that the shape of the claimed

disk is not new, but asserts that the design as a whole is patentable.

Haruna argues that the Board's reliance on *Cohn* is misplaced because that case relied at least in part on the color depletion theory of trademark jurisprudence, which was abrogated by the Supreme Court's decision in *Qualitex Co. v. Jacobson Products Co.*, 514 U.S. 159, 131 L. Ed. 2d 248, 115 S. Ct. 1300 (1995). *n1* *Haruna* [*1335] also attempts to distinguish *Cohn* by limiting it to its facts.

----- Footnotes -----

n1 The color depletion theory was based on the fact "that there are a limited number of colors in the palette, and that it is not wise policy to foster further limitation by permitting trademark registrants to deplete the reservoir." *In re Owens-Corning Fiberglas Corp.*, 774 F.2d 1116, 1120, 227 U.S.P.Q. (BNA) 417, 419 (Fed. Cir. 1985). In *Qualitex*, the Supreme Court noted that "when a color serves as a mark, normally alternative colors will likely be available for similar use by others," and stated that "if that is not so--if a 'color depletion' . . . problem does arise--the trademark doctrine of 'functionality' normally would seem available to prevent the anticompetitive consequences." *Qualitex*, 514 U.S. 159, 168-69, 131 L. Ed. 2d 248, 115 S. Ct. 1300. The doctrine of functionality "forbids the use of a product's feature as a trademark where doing so will put a competitor at a significant disadvantage because the feature is 'essential to the use or purpose of the article' or 'affects [its] cost or quality.'" *Id.* (alteration in original) (quoting *Inwood Labs., Inc. v. Ives Labs., Inc.*, 456 U.S. 844, 850 *n.10*, 72 L. Ed. 2d 606, 102 S. Ct. 2182 (1982)).

----- End Footnotes -----

[**10]

The Solicitor for the Patent Office argues that *Haruna's* design is obvious because *Benne* teaches that the substrate of its disks is initially transparent and because conventional disks have an outer rim that is transparent. The Solicitor argues that maintaining the transparency of the *Benne* disks or increasing the width of the transparent region of conventional disks would have been obvious to the skilled disk designer. The Solicitor argues that the Board's determination that

Benne provides motivation to widen the narrow transparent region of conventional disks is supported by substantial evidence, citing the teaching in Benne that the substrates of its disks are transparent in their initial states. See Benne, column 1, lines 15-16.

The Solicitor argues that this case is factually similar to Cohn because the design at issue in that case was transparent where the prior art was colored. The Solicitor argues that Cohn remains good law because it does not specifically rely on the trademark color depletion theory. Moreover, the Solicitor argues, the novelty and nonobviousness requirements of patent law are more stringent than the distinctiveness requirements of trademark law. The Solicitor **[**11]** argues that the facts of Iknayan also are similar to the present case because the design in that case was chromatic where the prior art was a dark color. The Solicitor argues that both Cohn and Iknayan support the Board decision on appeal because they both hold that changing the color of a region of a design does not make the new design patentable.

The patentability of a claimed design turns on whether its overall appearance and visual effect are novel and non-obvious. In re Rosen, 673 F.2d 388, 390, 213 U.S.P.Q. (BNA) 347, 349 (CCPA 1982). Section 103 applies to design patents in much the same manner as it applies to utility patents. Litton Sys., Inc. v. Whirlpool Corp., 728 F.2d 1423, 1441, 221 U.S.P.Q. (BNA) 97, 108 (Fed. Cir. 1984) ("35 U.S.C. 103 (and all the case law interpreting that statute) applies with equal force to a determination of the obviousness of either a design or a utility patent."); Durling v. Spectrum Furniture Co., 101 F.3d 100, 103, 40 U.S.P.Q.2D (BNA) 1788, 1790 (Fed. Cir. 1996) ("In the design patent context, the ultimate inquiry under section 103 is whether the claimed design would have been obvious to a designer of ordinary **[**12]** skill who designs articles of the type involved."). The obviousness of a design "is determined by ascertaining whether the applicable prior art contains any suggestion or motivation for making the modifications in the design of the prior art article in order to produce the claimed design." Hupp v. Siroflex of Am., Inc., 122 F.3d 1456, 1462, 43 U.S.P.Q.2D (BNA) 1887, 1891 (Fed. Cir. 1997). "A prima facie case of obviousness can be rebutted if the applicant . . . can show 'that the art in any material respect taught away' from the claimed invention." In re Geisler, 116 F.3d 1465, 1469, 43 U.S.P.Q.2D (BNA) 1362, 1365 (Fed. Cir. 1997) (quoting In re Malagari, 499 F.2d 1297, 1303, 182 U.S.P.Q. (BNA) 549, 533 (CCPA 1974)). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant." Tec Air, Inc. v. Denso Mfg.

Mich. Inc., 192 F.3d 1353, 1360, 52 U.S.P.Q.2D (BNA) 1294, 1298 (Fed. Cir. 1999).

The Board determined that the teachings of Benne combined with the general knowledge that conventional disks have a narrow transparent region at their rims renders **[**13]** the claimed design obvious. However, this determination ignores the teachings **[*1336]** in Benne that discourage a disk with the claimed design. As discussed above, the object of Benne is to conceal manufacturing defects in the outer zone of disks. Benne, column 2, lines 23-26. Benne achieves this object by treating the surface of the outer zone to provide a matte finish, or a colored surface, or a pattern, or a combination thereof. *Id.* at column 2, lines 40-49; column 8, lines 54-63. Broadening the transparent region of conventional disks would defeat the purpose of Benne, because providing a transparent region would not conceal any defects, and would result in a large region in which any defects would be readily apparent. Thus, Benne teaches away from the claimed design.

Benne's teaching that the outer zone of its disks may not be metallized does not suggest the claimed invention. According to Benne, even if the outer zone is not metallized, it will be provided with some sort of finish that diffuses or absorbs light. *Id.* at column 2, lines 40-49. Moreover, the fact that Benne teaches that the substrate for its disks is transparent in its initial state does not render the claimed design obvious. **[**14]** The invention is not directed to a substrate for a disk, but to the final product, a pre-recorded optical disk. Because Benne teaches away from a final product having a broad transparent outer region, it does not render the claimed design obvious.

Cohn and Iknayan do not require the result reached by the Board. As a preliminary matter, we note that this court has determined that color may play a role in the patentability of a claimed design. See, e.g., Avia Group Int'l, Inc. v. L.A. Gear Cal., Inc., 853 F.2d 1557, 1565, 7 U.S.P.Q.2D (BNA) 1548, 1554 (Fed. Cir. 1988) (citing, while discussing infringement, the district court's discussion of the "separate coloration" of the pivot point of the claimed design for a shoe); Litton, 728 F.2d at 1443, 221 U.S.P.Q. (BNA) at 109 (upholding the validity of a design patent for a microwave oven where one feature of the claimed design cited by the district court was an oven door that had a "three stripe border with a central color different from the inner and outer stripes"). More importantly, although the differences between the claimed and prior art designs in Cohn are similar to the difference between the claimed design and that of Benne, **[**15]** the prior art references considered in Cohn and Iknayan did not teach away from the claimed design.

The decisions in those cases therefore did not address a situation where the prior art taught away from replacing a colored region with a transparent region. Moreover, although the Court of Customs and Patent Appeals equated transparency with color in *Cohn*, the transparent region of the claimed design here differs more than by color from the outer zone of *Benne*. Specifically, the transparent region of the claimed design does not achieve the function of *Benne* of concealing defects in the disks. The difference between the design claimed in the '031 application and the design of the disks disclosed in *Benne* is one of more than "color alone" because of the unique difference in effect between a disk with a transparent outer region and a disk with an outer region of any other "color."

In both *Cohn* and *Iknayan*, the court determined that the designs on appeal did not have different overall appearances and visual effects than the designs of the prior art. *Cohn*, 80 F.2d at 67, 27 U.S.P.Q. (BNA) at 413 (determining that the difference between the transparent stripe of the claimed design and [**16] the light-colored stripe of the prior art was "indistinguishable in principle"); *Iknayan*, 274 F.2d at 944, 124 U.S.P.Q. (BNA) at 509 (stating that "the general appearance of appellants' tire is quite similar to that of [the prior art]"). Here, however, the Board did not make such a finding. The Board's failure to apply the [*1337] ultimate test for obviousness whether the overall appearance and visual effect of the claimed design is obvious in view of the prior art is fatal to its analysis. The Board therefore erred as a matter of law.

CONCLUSION

For the foregoing reasons, the decision of the Board is

REVERSED.

COSTS

Each party shall bear its own costs.

BROWN & WILLIAMSON TOBACCO CORPORATION, Plaintiff-Appellant, v. PHILIP MORRIS
INCORPORATED, Defendant-Cross Appellant.

99-1389, 99-1403

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

229 F.3d 1120; 2000 U.S. App. LEXIS 25913; 56 U.S.P.Q.2D (BNA) 1456

October 17, 2000, Decided

SUBSEQUENT HISTORY: [**1] Rehearing
Denied November 15, 2000, Reported at: 2000 U.S.
App. LEXIS 31899.

PRIOR HISTORY: Appealed from: United States
District Court for the Western District of Kentucky.
Chief Judge Charles R. Simpson, III.

DISPOSITION-1: AFFIRMED.

CASE SUMMARY

PROCEDURAL POSTURE: Plaintiff tobacco
company appealed an order of the United States
District Court for the Western District of Kentucky,
finding its patent of a 10-19 mm. cigarette failed for
obviousness based primarily on the prior art of an
earlier cigarette and three published references, under
35 U.S.C.S. § 103.

OVERVIEW: Plaintiff tobacco company appealed a
holding that three claims of its patent for a slender
cigarette were invalid for obviousness over the prior
art. Plaintiff sued defendant tobacco company alleging
infringement by its thin cigarette. On review the court
found that the district court committed no clear error as
to its factual findings, and that a prior cigarette and
three references predated plaintiff's product, and
justified a finding of obviousness under 35 U.S.C.S. §
103. Defendant had shown invalidity by clear and
convincing evidence. Although defendant's product
had some market success, the district court's failure to
consider its success was harmless error.

OUTCOME: Judgment affirmed because the district
court's finding of obviousness was based on strong
evidence. Although the district court erred by not
considering the success of the defendant's alleged
infringing cigarette, or considering secondary
indicators, the error were harmless given the modest
level of commercial activity and limited market share
achieved by that product.

COUNSEL: Stephen R. Smith, Morgan & Finnegan,
L.L.P., of New York, New York, argued for plaintiff-
appellant. With him on the brief were John A. Diaz,
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Wayda. Of counsel were Marc G. Schildkraut, and
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of counsel on the brief was William D. Grubbs,
Woodward, Hobson & Fulton, of Louisville,
Kentucky.

JUDGES: Before CLEVENGER, BRYSON, and
LINN, Circuit Judges.

OPINIONBY: LINN

OPINION: [*1122]

LINN, Circuit Judge.

Brown & Williamson Tobacco Corp. ("B&W") and
Philip Morris Inc. ("PM") seek review of a judgment
entered April 1, 1999 by the United States District
Court for the Western District of Kentucky. See *Brown
& Williamson Tobacco Corp. v. Philip Morris Inc.*,
No. 3:89CV-0470-S (W.D. Ky. Apr. 1, 1999) [**2]
(judgment); *Brown & Williamson Tobacco Corp. v.
Philip Morris Inc.*, 1999 U.S. Dist. LEXIS 22252, No.
3:89CV-0470-S (W.D. Ky. Apr. 1, 1999) (findings of
fact and conclusions of law) ("B&W Opinion"). B&W
appeals the district court's holding that claims 1, 4, and
11 of U.S. Reissue Patent No. 32,615 (the "Luke
patent" or "615 patent") were invalid for obviousness
over the prior art. n1 PM cross-appeals the district
court's holdings that: (1) claims 1, 4, and 11 of the
Luke patent were infringed n2 by the Virginia Slims
SuperSlims ("VSSS") cigarette manufactured by PM;
(2) PM's infringement was willful up until receipt of
oral opinions in March and May of 1989; and (3)
claims 1, 4, and 11 of the Luke patent were not invalid
due to an alleged public use. Because the district court
did not err in finding claims 1, 4, and 11 obvious over
the prior art, we affirm the district court's decision that

claims 1, 4, and 11 are invalid. Because that decision moots the remaining issues, we do not address the district court's other invalidity decision or [*1123] its decisions regarding infringement and willfulness.

----- Footnotes -----

n1 Although the district court's judgment did not identify specific claims, the district court's opinion specified that only claims 1, 4, and 11 of the '615 patent were in issue in the litigation. See B&W Opinion, slip op. at 6.

[**3]

n2 We treat the district court's findings of invalidity and infringement as alternative holdings.

----- End Footnotes-----

BACKGROUND

John Luke, the inventor of the Luke patent, was an employee of British American Tobacco Co., Ltd. ("BAT") and worked in the field of research and design of cigarettes. In the early 1980s, Luke's work was focused on using less tobacco in a cigarette and thereby reducing manufacturing expenses. His work led him to conclude that smaller circumference cigarettes burned more efficiently. Luke made several prototypes of reduced circumference cigarettes and disclosed his discovery to management. B&W, a subsidiary of BAT, became aware of Luke's reduced circumference cigarettes and obtained an exclusive license for them in the United States.

B&W filed a patent application covering Luke's discovery and U.S. Patent No. 4,637,410 (the " '410 patent") issued on January 20, 1987. Shortly thereafter, citing an error in the analysis of a prior art patent to Lephardt, B&W filed a reissue application and also submitted additional references for consideration by the U.S. Patent and Trademark Office. After [**4] some amendments, the application was reissued as the Luke patent on March 1, 1988. The Luke patent claims a foreign application priority date of May 24, 1985 and a U.S. priority date of July 22, 1985. The Luke patent contains fifteen claims, of which only claim 1 is independent. The only claims involved in the present litigation are claims 1, 4, and 11. The central limitation in the Luke patent is cigarette circumference, which is limited to 10-19 mm. As a point of reference, traditional cigarettes have circumferences of 23-27 mm.

Around the time that the '410 patent issued, B&W began selling a 17 mm cigarette which was eventually marketed under the name "Capri." The Luke patent discloses an embodiment having a circumference of 17 mm and the parties agree that claims 1, 4, and 11 read on the Capri. Shortly after the '410 patent issued and B&W began marketing Capri, PM began developing a product to compete with the Capri. It took more than two years, however, for PM to place its competing cigarette, the VSSS, on the market.

On May 30, 1989, B&W filed a complaint against PM for infringement of the Luke patent, and subsequently a bench trial was held. In its decision, the district court [**5] held that the asserted claims were invalid for obviousness and willfully infringed, but not invalid due to an alleged public use. The district court also held that the Luke patent was not unenforceable due to inequitable conduct. Both parties appeal the decision to this court. They appeal or cross-appeal each holding except for the finding of no inequitable conduct. We have exclusive jurisdiction pursuant to 28 U.S.C. § 1295(a)(1) (1994).

DISCUSSION

A. Standard of Review

On appeal from a bench trial, we review a district court's decision for errors of law and clearly erroneous findings of fact. See Fed. R. Civ. P. 52(a); Interspiro USA, Inc. v. Figgie Int'l Inc., 18 F.3d 927, 930, 30 U.S.P.Q.2D (BNA) 1070, 1072 (Fed. Cir. 1994).

B. Analysis

1. Claims at Issue

Only claims 1, 4, and 11 of the Luke patent are at issue. Claim 1 is reproduced below:

1. A finished cigarette of commercially acceptable quality and elegant appearance

in the form of an elongated rod of uniform cross-section throughout its length capable of sustained smoulder when lit but not being smoked, said elongated rod consisting of

a cut tobacco filler,

a cigarette paper [**6] wrapper, circumscribing said cut tobacco filler, [**1124]

a filter in abutment with one end of said cut tobacco filler and

a tipping wrapper maintaining said filter in abutment with said one end of said cut tobacco filler,

the circumference of said elongated rod being within a range of 10 mm to 19 mm, and having a cut tobacco filler packing density within the range of 150 mg per cm³ to 350 mg per cm³ yielding a free burn rate of said rod within a range of 25 to 45 mg min⁻¹,

the aforesaid cigarette utilizing tobacco at greater efficiency than conventional commercially marketed cigarettes.

Luke patent, col. 3, ll. 22-38. Although the claim appears in the Luke patent as one continuous paragraph, without parsing, we have parsed the claim for clarity in our analysis.

Claim 4 reads as follows: "A cigarette as claimed in claim 1, wherein the packing density of said cut tobacco filler is within a range of 200 mg per cm³ to 300 mg per cm³." *Id.* at col. 4, ll. 1-3. Claim 11 reads as follows: "A cigarette as claimed in claim 1, which provides in excess of about 8 puffs." *Id.* at col. 4, ll. 26-27. The construction of these claims is not in dispute.

2. Obviousness

The ultimate determination [**7] of whether an invention would have been obvious is a legal conclusion based on the totality of the evidence, see Richardson-Vicks Inc. v. Upjohn Co., 122 F.3d 1476, 1483, 44 U.S.P.Q.2D (BNA) 1181, 1187 (Fed. Cir. 1997), including underlying factual inquiries such as: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. See Graham v. John Deere Co., 383 U.S. 1, 17-18, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966); In re Dembiczak, 175 F.3d 994, 998, 50 U.S.P.Q.2D (BNA) 1614, 1616 (Fed. Cir. 1999), abrogated on other grounds by In re Gartside, 203 F.3d 1305, 53 U.S.P.Q.2D (BNA) 1769 (Fed. Cir. 2000). Accordingly, this ultimate determination of obviousness is reviewed without deference, while any factual findings are reviewed for clear error. See Winner Int'l Royalty Corp. v. Wang, 202 F.3d 1340, 1348, 53 U.S.P.Q.2D (BNA) 1580, 1586 (Fed. Cir. 2000). The Supreme Court has stated that a holding is clearly erroneous when, "although there is evidence to support [the holding], the reviewing court [**8] on the entire evidence is left with the definite and firm conviction that a mistake has been committed." United States v. United States Gypsum Co., 333 U.S. 364, 395, 92 L. Ed. 746, 68 S. Ct. 525 (1948). In deciding the legal question of obviousness, we bear in mind that the party asserting invalidity of a patent must prove the disputed facts by clear and convincing evidence. See

Georgia Pacific Corp. v. United States Gypsum Co., 195 F.3d 1322, 1330, 52 U.S.P.Q.2D (BNA) 1590, 1597 (Fed. Cir. 2000); Newell Cos., Inc. v. Kenney Mfg. Co., 864 F.2d 757, 767, 9 U.S.P.Q.2D (BNA) 1417, 1425 (Fed. Cir. 1988).

The statutory standard for the ultimate determination of obviousness provides that a claimed invention is unpatentable if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103 (1994); see also Graham, 383 U.S. at 13. In line with this statutory standard, our case law provides that "the consistent criterion for determination of obviousness is whether the prior [**9] art would have suggested to one of ordinary skill in the art that this process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art." In re Dow Chem., 837 F.2d 469, 473, 5 U.S.P.Q.2D (BNA) 1529, 1531 (Fed. Cir. 1988). Two requirements are contained in this criterion.

The first requirement is that a showing of a suggestion, teaching, or motivation to combine the prior art references [**1125] is an "essential evidentiary component of an obviousness holding." C.R. Bard, Inc. v. M3 Sys. Inc., 157 F.3d 1340, 1352, 48 U.S.P.Q.2D (BNA) 1225, 1232 (Fed. Cir. 1998). This evidence may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved. See Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573, 37 U.S.P.Q.2D (BNA) 1626, 1630 (Fed. Cir. 1996). However, the suggestion more often comes from the teachings of the pertinent references. See In re Rouffet, 149 F.3d 1350, 1359, 47 U.S.P.Q.2D (BNA) 1453, 1459 (Fed. Cir. 1998). This showing must be clear and particular, and broad conclusory statements about [**10] the teaching of multiple references, standing alone, are not "evidence." See Dembiczak, 175 F.3d at 1000, 50 U.S.P.Q.2D (BNA) at 1617. However, the suggestion to combine need not be express and "may come from the prior art, as filtered through the knowledge of one skilled in the art." Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1472, 43 U.S.P.Q.2D (BNA) 1481, 1489 (Fed. Cir. 1997).

The second requirement is that the ultimate determination of obviousness "does not require absolute predictability of success. . . . All that is required is a reasonable expectation of success." In re O'Farrell, 853 F.2d 894, 903-904, 7 U.S.P.Q.2D (BNA) 1673, 1681 (Fed. Cir. 1988); see also In re Longi, 759 F.2d 887, 897, 225 U.S.P.Q. (BNA) 645, 651-52 (Fed. Cir. 1985).

3. Factual Inquiries

The district court made findings on all four of the Graham factors. The court described the prior art at length, described the level of ordinary skill in cigarette design at the time when Luke made his invention, explained the differences between the prior art and the claims at issue, and assessed various secondary indicators of nonobviousness. The district court found [**11] obviousness based primarily on the prior art of the More cigarette and the three references of Rice, Resnik, and Muramatsu.

a. The Prior Art "More" Cigarette

In 1974, R.J. Reynolds Tobacco Co. marketed a cigarette in the United States under the name of "More." The More cigarette is, therefore, prior art under 35 U.S.C. § 102(b). The district court found that the More cigarette had a circumference of 20.8 mm, had a packing density of 263 mg/cm³, had a static burn rate of 39-42 mg/min, provided 15.4 puffs per cigarette, and delivered 53 mg of tobacco per puff. The district court further found that the More cigarette met every limitation of claims 1, 4, and 11 except the circumference limitation. The record supports each of these findings and the parties do not dispute them.

b. Level of Ordinary Skill

The district court found, and the parties do not dispute, that a person of ordinary skill in the art of cigarette design in 1985 would have had a bachelor's degree in either engineering, chemistry, physics, or chemical engineering, and would have had at least five years experience in the field of cigarette design.

c. Prior Art Teaching to Reduce Circumference [**12]

The parties agree that as of the time the invention claimed in the Luke patent was made, one of ordinary skill in the art of cigarette design would have been familiar with reducing the circumference of an orthodox (25 mm) cigarette to a circumference as small as 21 mm, and that a 21 mm cigarette, such as the More cigarette, could have been manufactured within commercially acceptable parameters. The parties dispute, however, whether a further reduction from the orthodox circumference of about 25 mm to the range of 10 to 19 mm, with the parameters specified in claims 1, 4, and 11 of the '615 patent, would have been obvious at that time to [**1126] one skilled in the art under 35 U.S.C. § 103.

In making the Luke invention, Luke discovered that his 10 to 19 mm cigarette utilized tobacco at a more efficient rate than conventional cigarettes and afforded certain other advantages which he claims were heretofore unknown to those skilled in the art. Luke refers to this efficiency as tobacco utilization

efficiency ("TUE"), which reflects the amount of tobacco consumed per puff. A lower value of TUE reflects a more efficient cigarette. The concept of TUE is critical to the obviousness [**13] analysis inasmuch as the discovery of the increased efficiency of a reduced diameter cigarette was Luke's key to solving his expressed long-felt need to reduce the amount of tobacco used in a cigarette. According to Luke, his recognition that a commercially adequate puff count and sustained smoulder could be achieved in a 10 to 19 mm circumference cigarette was an unobvious advance and successfully achieved the goal of improving the efficiency of burning tobacco.

The question thus before us is whether one skilled in the art of cigarette design would have recognized at the time of the Luke invention that a reduction in circumference of the thinnest cigarette then on the market would yield a cigarette which burns tobacco more efficiently, as TUE is defined by Luke.

The district court found that at the time of the Luke invention, Molins Machine Co. ("Molins") was a leading manufacturer of cigarette-making machines and sold cigarette machines that could produce cigarettes of different preselected circumferences. The record shows that Molins sold a Mark 5 machine from the 1930s through the 1960s, and that a series of change parts were also sold at that time that enabled the production [**14] of varying sizes of cigarettes, including cigarettes with as small as a 15 mm circumference, at a rate of up to 1350 cigarettes per minute. The district court found, therefore, that a person of ordinary skill at the time the invention was made would have had the technical capability to make a 19 mm cigarette if so motivated. The parties do not dispute this finding.

The district court found that the three references to Rice, Resnik, and Muramatsu, in combination, provided the motivation for such change by teaching that reducing the circumference would save money. We discuss these findings and each of the cited references below.

The first of the three references relied on by the district court is an article written by R.L. Rice. R.L. Rice, A Weight Loss Technique for Determining Rate of Static Burn, Tobacco Science, Dec. 1970, at 173 ("Rice article"). The district court found that the Rice article taught that a directly proportional relationship existed between the static burn rate of a cigarette and its circumference. The district court also found that while the test data in the Rice article only included circumferences from 23 mm to 27 mm, Rice did not limit his results to that [**15] range, and the extension of the directly proportional relationship down to

circumferences as low as 19 mm would not be unexpected.

B&W argues that the Rice article does not close the gap between the claimed 19 mm circumference and the 20.8 mm circumference of the More cigarette. B&W also argues that the Rice article does not address claimed limitations such as tobacco density, burn rate, TUE, or sustained smoulder, nor address features such as an acceptable puff count, acceptable resistance to draw, and palatability, which B&W associates with commercially acceptable quality. PM responds that the district court was correct in finding that an extension of the Rice relationship to 19 mm would not be unexpected. As support for this contention, PM notes that the Rice relationship actually predicts the static burn rate for the More cigarette, and predicts the claimed range of static burn rates for cigarettes having a 10-19 mm circumference. [*1127]

We discern no clear error in the district court's findings. The Rice article itself includes an equation, as the district court noted, showing the directly proportional relationship between a cigarette's static burn rate and its circumference. See [*16] Rice article at 174. The Rice article also provides, in Table 4 for example, data for circumferences as low as 23 mm. While such data does not predict with certainty that the relationship would hold at 19 mm, the district court is not clearly erroneous in concluding that it would have been an expected result. B&W's arguments regarding the claimed features and commercially acceptable quality are inapposite because the Rice article was not cited by the district court as a reference for any of these attributes. Rice, however, did not address the effect that decreasing the circumference had on TUE or the puff count, so we turn next to the Resnik article.

The second reference relied on by the district court is an article written by Dr. Frank Resnik. Frank Resnik, *Factors Affecting Static Burn Rate*, Tobacco Science, Sept. 1977, at 103 ("Resnik article"). The district court found that the Resnik article, as with the Rice article, taught the directly proportional relationship between circumference and static burn rate and provided experimental data for circumferences as low as 23 mm. More importantly, the district court found that Resnik taught that a reduction in circumference resulted [*17] in a decreased value of TUE (increased efficiency), although Resnik did not refer to it as such. The district court found that this teaching provided a motivation to combine the references and make cigarettes of smaller circumference because cigarettes with decreased TUE values use less tobacco and therefore cost less to produce.

B&W echoes the arguments it levied against the Rice article, asserting that the Resnik article does not close the gap between the claimed 19 mm circumference and the 20.8 mm circumference of the More cigarette. B&W also argues that the Resnik article does not address the additional claim limitations or the various features that B&W associates with commercially acceptable quality. We note, however, that the district court did not cite the Resnik article for these attributes. B&W does not challenge the district court's finding that the Resnik article teaches that the value of TUE decreases as circumference decreases. PM responds by pointing out that the Resnik article expresses the directly proportional relationship between circumference and static burn rate without any boundary on the range of circumferences for which it holds. PM further notes that Resnik [*18] himself testified that the article intended to show that the relationship could be extrapolated beyond the experimental data for 23 mm.

We agree with the district court's findings. The Resnik article clearly shows, in Figure 9 and the accompanying text for example, the directly proportional relationship between circumference and static burn rate. It also states that "the percentage decrease in puff count caused by decreasing the circumference is not as great as the percentage weight reduction." Resnik article at 106. Thus, the Resnik article does teach that reducing circumference decreases the value of TUE and this provides a motivation to reduce the circumference of the More cigarette. It is clear, however, that the relationship between circumference and static burn rate cannot hold for all circumferences, n3 and neither the Rice article nor the Resnik article expressly teaches this relationship for circumferences any lower than approximately 23 mm. To fill that void we turn to the Muramatsu article.

----- Footnotes -----

n3 In his deposition, Resnik concedes that the relationship could not extrapolate to a zero circumference.

----- End Footnotes -----

[*19]

The third reference relied on by the district court is a translation of a Japanese-language article written by M. Muramatsu. M. Muramatsu, *Studies on the* [*1128] *Transfer Phenomena in Naturally Smoldering Cigarettes*, 123 *Nippon Senbai Kosha Chuo Kenkyusho* 9 (1981) ("Muramatsu article"). The

district court found that the Muramatsu article taught that the directly proportional relationship between circumference and static burn rate extended, at least theoretically, down to circumferences as low as 18.8 mm. The district court further found that the Muramatsu article, in combination with the Rice and Resnick articles, provided the motivation to make a cigarette with a 19 mm circumference. The district court based its findings on Figure 9-4 of the Muramatsu article. Figure 9-4 plots the circumference versus the static burn rate of several experimental data points. One of the experimental data points is for a circumference of approximately 20.2 mm, as the district court also found. Figure 9-4 further includes a theoretical data point having a circumference of 18.8 mm, which is the smallest circumference of all of the data points. Superimposed on these data points is a best-fit line demonstrating [**20] the directly proportional relationship.

B&W notes that the 18.8 mm data point in the Muramatsu article is theoretical and that the article itself does not discuss this theoretical data point. B&W argues that the theoretical data point alone cannot be used as a basis for assuming that the article teaches that the directly proportional relationship extends that far. B&W further argues that the superimposed line is inaccurate because the theoretical data point lies above the line and that this indicates that the directly proportional relationship is already breaking down. Accordingly, B&W repeats its assertion that neither the Muramatsu article nor any other prior art closes the gap to the claimed 19 mm circumference.

We hold that the district court findings are not clearly erroneous. As described above, Figure 9-4 of the Muramatsu article does show that the directly proportional relationship between circumference and static burn rate holds, at least in theory, for circumferences as low as 18.8 mm. We find persuasive the district court's reasoning that it could not "presume that the inclusion of the data point by Muramatsu was without purpose or scientific reason." B&W Opinion, [**21] slip op. at 21. The fact that the theoretical data point lies slightly above the best-fit line does not detract from the article's teaching.

The key to the motivation to reduce the circumference is the Resnik article's teaching that the value of TUE decreases as the circumference is reduced. The motivation arises from the fact that the decreasing TUE value results in less tobacco being utilized, thereby saving money. While the Resnik article taught that both the value of TUE and the static burn rate decrease as the circumference is reduced, it did not explicitly teach that either of these relationships holds as the circumference is reduced all the way down to 19

mm. The district court found that the Muramatsu article filled this void with the teaching that static burn rate continues to linearly decrease, at least in theory, as the circumference is reduced to 19 mm. While the Muramatsu article did not explicitly address TUE, we cannot say that we are "left with the definite and firm conviction that a mistake has been committed" by the district court. United States Gypsum, 333 U.S. at 395. The Muramatsu teaching, in combination with the Resnik article's teaching that [**22] TUE values and static burn rate move together, suggests that the value of TUE will also continue to decrease (improved efficiency) as the circumference is reduced to 19 mm. As the district court found, "one skilled in the art of cigarette design armed with the prior art would know that a 10% reduction in circumference of the thinnest cigarette then on the market would yield a cigarette which burns tobacco more efficiently, as TUE is defined by Luke." B&W Opinion, slip op. at 58. This reduction in the value of TUE provides the motivation to reduce the circumference down to 19 mm. [**1129]

d. Sustained Smoulder

B&W asserts that even if there were a motivation to reduce the circumference of the More cigarette, there would have been an expectation that a 19 mm cigarette would not be capable of sustained smoulder. The district court specifically addressed this concern. It found that the prior art, including the three references and the market successes of the More and other slim cigarettes, would teach one of ordinary skill that a commercially acceptable cigarette capable of sustained smoulder could be manufactured with a circumference of 19 mm. See B&W Opinion, slip op. at 24-25, 30. [**23]

We agree with the district court's finding regarding sustained smoulder. The inventor of the More cigarette, Cundiff, testified that he had concerns with smoulder, as well as a variety of other interrelated characteristics such as draw and pressure drop. As the district court noted, however, the success of the More revealed that Cundiff had successfully dealt with these concerns for a cigarette with a circumference of 20.8 mm. See B&W Opinion, slip op. at 30. It is not clearly erroneous to expect, as the district court did, that a person of ordinary skill would have been able to address these concerns adequately while reducing the circumference another 8.7% down to 19 mm. Further, B&W admits that the static burn rate at which conventional commercial cigarettes self-extinguish is in the range of 25-40 mg/min. The static burn rate of the More cigarette was found to be 39-42 mg/min. Given an 8.7% reduction in circumference, the Rice formula, which was described earlier and which was found to be extendible to 19 mm by Muramatsu's

teaching, yields an expected static burn rate of 35.6-38.3 mg/min. (91.3% of the range of 39-42 mg/min.) for a 19 mm cigarette. This is well above B&W's [**24] stated lower limit of 25 mg/min. for conventional cigarettes.

e. Secondary Indicators of Nonobviousness

As outlined earlier, Graham and its progeny require the consideration of various secondary indicators of nonobviousness. The secondary indicators listed in Graham are: (1) commercial success; (2) long-felt but unsolved needs; and (3) failure of others. See Graham, 383 U.S. at 17. Other secondary indicators have been considered as well. See Environmental Designs, Ltd. v. Union Oil Co. of Cal., 713 F.2d 693, 697-98, 218 U.S.P.Q. (BNA) 865, 869 (Fed. Cir. 1983) (considering skepticism or disbelief before the invention as an indicator of nonobviousness); Allen Archery, Inc. v. Browning Mfg. Co., 819 F.2d 1087, 1092, 2 U.S.P.Q.2D (BNA) 1490, 1493 (Fed. Cir. 1987) (considering copying, praise, unexpected results, and industry acceptance as indicators of nonobviousness); Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679, 7 U.S.P.Q.2D (BNA) 1315, 1319 (Fed. Cir. 1988) (considering copying as an indicator of nonobviousness). The district court made findings related to a number of these secondary indicators.

i. Commercial Success [**25]

We examine separately the commercial success of the Capri and the VSSS. With regard to the Capri, the district court found from the evidence before it that it was "impossible . . . to distinguish market share resulting from the patented attributes of the Capri cigarette, from that which was achieved through targeted marketing and image development." B&W Opinion, slip op. at 61. B&W argues that the district court improperly shifted the burden to B&W to prove a nexus between the commercial success of Capri and the claimed features, and that such a nexus should be presumed because the Capri embodies the claimed features. PM responds that it produced sufficient evidence to demonstrate that Capri's sales were unrelated to its patented features, thus overcoming any presumption of nexus, and that no burden was improperly shifted to B&W. As explained below, we hold that the district court was not clearly [**1130] erroneous in finding that any nexus which may have been established for the Capri was rebutted by the evidence of record.

A nexus between commercial success and the claimed features is required. See J.T. Eaton & Co. v. Atlantic Paste & Glue Co., 106 F.3d 1563, 1571, 41 U.S.P.Q.2D (BNA) 1641, 1647 (Fed. Cir. 1997):

[**26] Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392, 7 U.S.P.Q.2D (BNA) 1222, 1226 (Fed. Cir. 1988). However, if the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus. See J.T. Eaton, 106 F.3d at 1571, 41 U.S.P.Q.2D (BNA) at 1647; Demaco, 851 F.2d at 1392-93, 7 U.S.P.Q.2D (BNA) at 1226. The presumed nexus cannot be rebutted with mere argument; evidence must be put forth. See Demaco, 851 F.2d at 1393, 7 U.S.P.Q.2D (BNA) at 1226-27 ("It is thus the task of the challenger to adduce evidence Argument and conjecture are insufficient.") (internal quotations and citation omitted). In this case, a nexus should be presumed because the Capri encompasses the claimed features.

However, there is ample evidence of record which was presented to rebut this presumed nexus. The record shows that another slim cigarette brand, containing all of the claimed features but not targeting female smokers, was a commercial failure. The record also shows that B&W marketed the Capri toward female smokers [**27] and that the feminine packaging of the Capri was important to these smokers and influenced their purchase decisions. The record further shows that B&W engaged in promotional offers for years after the Capri launch, and it indicates that many Capri smokers originally tried Capri as the result of a promotion and would discontinue smoking Capri without the promotions.

The district court did not consider the commercial success of the VSSS, PM's competing product, as a secondary indicator of nonobviousness for the Luke patent. B&W argues that this was error, in light of the fact that the district court found the VSSS to infringe the Luke patent. See Gambro Lundia AB v. Baxter Healthcare Corp., 110 F.3d 1573, 1579, 42 U.S.P.Q.2D (BNA) 1378, 1384 (Fed. Cir. 1997) (considering the commercial success of the infringing product as evidence of the commercial success of the claimed invention). PM responds that the combined market share of the VSSS and the Capri is only 1% and that this is insufficient to support a finding of commercial success.

We agree with B&W that the district court erred by not considering the success of the VSSS. Our case law provides that the success of an infringing [**28] product is considered to be evidence of the commercial success of the claimed invention. See *id.* However, as we discuss later after reviewing the remaining secondary indicators of nonobviousness, the district court's error is harmless because the modest level of commercial activity and limited market share achieved

by the VSSS cannot overcome the strong evidence of obviousness. See Richardson-Vicks, 122 F.3d at 1483, 44 U.S.P.Q.2D (BNA) at 1187.

ii. Additional Secondary Indicators

With regard to other secondary indicators of nonobviousness, the district court found that: (1) there was no evidence that others had tried and failed to create a reduced circumference cigarette; (2) there was no long-felt but unmet need to use less tobacco in a cigarette; and (3) there were no unexpected results. B&W does not appear to challenge these specific findings. Moreover, the record supports each of these findings and we hold that the district court was not clearly erroneous.

B&W argues however, and we agree, that the district court erred with regard to certain other secondary indicators. Specifically, B&W asserts that the district court erred as a matter of law in discounting PM's [**29] statements of praise for the Capri, in failing to consider PM's skepticism [**1131] and Cundiff's skepticism, and in failing to consider PM's copying of the Capri. Accordingly, in reaching the ultimate legal determination regarding obviousness, we will accept B&W's characterization of PM's skepticism, praise, and copying of the Capri, as well as Cundiff's skepticism.

The scope of these errors is limited, however, by two district court findings that are not clearly erroneous. First, the district court found that there was no evidence that any other tobacco company had praised the Capri. Second, the district court found B&W's skepticism and characterization of the conventional wisdom unpersuasive, stating:

B&W offered some testimony that it was the conventional wisdom, prior to Luke's invention, that a cigarette in the range of 10 to 19 mm would 'burn up like a fuse' or would not be capable of sustained smoulder or would be otherwise commercially unacceptable. However, the literature of Rice and Muramatsu, coupled with the existing cigarettes in the industry would have suggested otherwise to one skilled in the art of cigarette design.

B&W Opinion, slip op. at 24. As we discuss [**30] immediately below, these limited district court errors are harmless, even when coupled with the presumed market share of the VSSS, because they cannot overcome the strong evidence of obviousness.

4. Ultimate Determination of Obviousness

As stated earlier, the ultimate determination of whether an invention is obvious is a legal question based on the totality of the evidence. See Richardson-Vicks, 122 F.3d at 1483, 44 U.S.P.Q.2D (BNA) at 1187. That evidence includes the district court's findings, which

we have upheld, that the prior art: (1) included the More cigarette which met all of the limitations of the claims at issue except the circumference limitation; (2) provided motivation to reduce the circumference of the More by less than 9% to the claimed range; and (3) taught that sustained smoulder could be achieved at a 19 mm circumference. This constitutes overwhelming evidence of obviousness, particularly in light of the relatively small difference between the prior art More cigarette and the claimed invention, and the high degree of skill for the ordinary artisan.

The only evidence which B&W can marshal against these findings consists of the secondary indicators of nonobviousness [**31] which the district court erred in not considering. Those indicators are: (1) the market share of the VSSS; (2) PM's skepticism, praise, and copying; and (3) Cundiff's skepticism. We will assume, as B&W argues, that the VSSS enjoyed a 0.5% market share and we will accept B&W's characterization of PM's skepticism, praise, and copying of the Capri, as well as Cundiff's skepticism. We find persuasive, however, the facts that despite PM's skepticism, praise, and copying it was only able to achieve a 0.5% market share with the VSSS, and that only a single competitor is alleged to have praised or copied the Capri. Further, although Cundiff's skepticism is entitled to some weight, we find persuasive the district court's disagreement with the purported conventional wisdom, at the time of the Luke invention, that a 19 mm cigarette was not feasible. See B&W Opinion, slip op. at 24. Accordingly, these indicators of nonobviousness cannot overcome the strong evidence of obviousness. See Newell, 864 F.2d at 769, 9 U.S.P.Q.2D (BNA) at 1427 (finding obviousness despite strong evidence of commercial success). The district court's errors in not considering various secondary indicators are, [**32] therefore, harmless. See id. at 768, 9 U.S.P.Q.2D (BNA) at 1426 (stating that secondary indicators "do not control the obviousness conclusion").

We conclude that the prior art would have suggested to one of ordinary skill in the art at the time the '615 invention was made that claims 1, 4, and 11 should be carried out and would have a reasonable likelihood of success. See In re Dow [**1132] Chem., 837 F.2d at 473, 5 U.S.P.Q.2D (BNA) at 1531. Accordingly, we hold as a matter of law that claims 1, 4, and 11 would have been obvious over the prior art and are, therefore, invalid under 35 U.S.C. § 103.

CONCLUSION

Because the district court did not err in finding claims 1, 4, and 11 obvious over the prior art, we do not address the district court's other invalidity decision or its decisions regarding infringement and willfulness.

For the reasons set forth above, we affirm the district court's judgment that claims 1, 4, and 11 are invalid under 35 U.S.C. § 103.

AFFIRMED

SCRIPPS CLINIC & RESEARCH FOUNDATION, REVLON, INC., and RORER GROUP INC., Plaintiffs-Appellants, v. GENENTECH, INC., Defendant/Cross-Appellant, and MILES, INC., Defendant-Appellee. SCRIPPS CLINIC & RESEARCH FOUNDATION and REVLON, INC., Plaintiffs-Appellants, v. CHIRON CORPORATION, Defendant-Appellee

Nos. 89-1541, 89-1542, 89-1543, 89-1646, 89-1647

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

927 F.2d 1565; 1991 U.S. App. LEXIS 3925; 18 U.S.P.Q.2D (BNA) 1001

March 11, 1991, Decided

SUBSEQUENT HISTORY: As Corrected March 26, 1991. Rehearing Denied April 30, 1991, Reported at: 1991 U.S. App. LEXIS 8701. Suggestion for Rehearing In Banc Declined May 14, 1991, Reported at: 1991 U.S. App. LEXIS 33486.

PRIOR HISTORY: [**1] Appealed from: U.S. District Court for the Northern District of California; Judge Schwarzer.

DISPOSITION-1: Affirmed In Part, Reversed In Part, Vacated In Part, And Remanded

CASE SUMMARY

PROCEDURAL POSTURE: The parties filed appeals, which were consolidated, from and order of the United States District Court for the Northern District of California, which issued four opinions concerning litigation about a patent for a complex protein essential to blood clotting and decided several motions for summary judgment. Each party challenged the adverse decisions against that party.

OVERVIEW: Plaintiffs, assignee and licensees of a patent for a complex protein naturally occurring in normal blood and essential to blood clotting, sued defendants for patent infringement. In four opinions, the district court decided several motions for summary judgment. By appeal and cross-appeal, each party challenged the adverse decisions against that party. The court held that the element of intent was essential to the defense of inequitable conduct, and remanded the dispute about the credibility of the inventors' statements about the purity of the product. Subjective intent was not determinative of the need for a reissue application, however, and so plaintiffs were entitled to summary judgment on that issue. Defendants' contention that the reverse doctrine of equivalents applied raised questions of scientific and evidentiary fact requiring a trial. The court also held that product-by-process claims were not limited to product prepared by the process set forth in the claims.

OUTCOME: The court decided that the issues were appropriately decided summarily, including plaintiffs' need for a reissue application and compliance with the best mode requirement. The court reversed and remanded the issues on which summary judgment was inappropriately granted, including the defenses of inequitable conduct, enablement, and anticipation.

COUNSEL: William S. Feiler, Morgan & Finnegan, of New York, New York, argued for Plaintiffs-Appellants. With him on the brief were Eugene Moroz, Patricia S. Rocha, Bruce A. Pokra and Stephen V. Bomse, Heller, Ehrman, White & McAuliffe, of San Francisco, California, of Counsel.

James W. Geriak, Lyon & Lyon, of Los Angeles, California, argued for Defendant/Cross-Appellant. With him on the brief were Douglas E. Olson, Bradford J. Duft and Karol M. Pessin. Also on the brief were Thomas J. Morgan and Melvin Blecher, Lyon & Lyon, of Washington, District of Columbia, Arnold Sprung, Sprung Horn Kramer & Woods, of New York, New York, argued for Defendant-Appellee. With him on the brief were Nathaniel D. Kramer and Alan J. Grant.

William L. Anthony, Townsend & Townsend, of Palo Alto, California, represented Chiron Corporation. Of Counsel was Noemi C. Espinosa, Townsend & Townsend, of Palo Alto, California.

JUDGES: Markey * and Newman, Circuit Judges, and Beer, District Judge. **

* Circuit Judge Markey vacated the position of Chief Judge on June 27, 1990.

** The Honorable Peter Beer, United States District Court for the Eastern District of Louisiana, sitting by designation.

[**2]

OPINIONBY: NEWMAN

OPINION: [*1568] NEWMAN, Circuit Judge.

This litigation concerns a substance called human Factor VIII:C, a complex protein that occurs naturally in normal blood and is essential to the clotting of blood. The patent in suit, United States Reissue Patent No. 32,011 (the "R '011" patent), is entitled "Ultrapurification of Factor VIII Using Monoclonal Antibodies", inventors Theodore S. Zimmerman and Carol A. Fulcher. Assigned to Scripps Clinic and Research Foundation, it was licensed exclusively to Revlon, Inc. Subsequent to the filing of this suit Revlon sold its interest to Rorer Group, Inc.

By appeal and cross-appeal, the parties n1 raise various issues of patent validity and enforceability, infringement and inducement to infringe, and reissue law and practice, all of which were decided on motions for summary judgment. Each side challenges the decision of certain issues adverse to it, and the final judgment based thereon. n2

----- Footnotes -----

n1 The plaintiffs will be grouped as "Scripps" unless otherwise stated. The defendants will be grouped as "Genentech" unless otherwise stated.

n2 These consolidated appeals and cross-appeals arise from judgments and orders of the United States District Court for the Northern District of California. Scripps Clinic & Research Foundation v. Genentech, Inc., 666 F. Supp. 1379, 3 U.S.P.Q.2d (BNA) 1481 (N.D. Cal. 1987); Scripps Clinic and Research Foundation v. Genentech, Inc., 678 F. Supp. 1429, 6 U.S.P.Q.2d (BNA) 1018 (N.D. Cal. 1988) (on reconsideration); Scripps Clinic and Research Foundation v. Genentech, Inc., 707 F. Supp. 1547, 11 U.S.P.Q.2d (BNA) 1187 (N.D. Cal. 1989); and Scripps Clinic and Research Foundation v. Genentech, Inc., 724 F. Supp. 690, 12 U.S.P.Q.2d (BNA) 1157 (N.D. Cal. 1989) (Order).

----- End Footnotes -----

[**3]

The Invention

Factor VIII:C, called the clotting or procoagulant factor, is found in all mammals, although it differs among species. It has been the subject of extensive scientific research, over many years. At the time the

claimed invention was made, it was known that human Factor VIII:C is a complex protein produced by the Factor VIII:C gene and secreted into the blood stream. It occurs in normal blood plasma (plasma is the fluid fraction of blood) at a concentration of about 200 nanograms per milliliter. The total protein content of plasma is about 70 milligrams (0.070 gram) per milliliter; since a nanogram is one billionth of a gram, the total protein in plasma is 350,000 times greater than the Factor VIII:C protein in plasma. Most of the problems faced by researchers attempting to isolate Factor VIII:C were due to the amount and nature of the other proteins in the plasma.

It was known that in normal blood Factor VIII:C exists in complex association with another protein, named the "von Willebrand factor" or Factor VIII:RP (RP means "related protein"). The weight ratio of Factor VIII:C to Factor [**4] VIII:RP in normal blood is about 1:100.

Before the invention here at issue was made, scientists had succeeded in concentrating the Factor VIII:C in plasma. This concentrate has been used to replace transfusions of whole blood in the treatment of hemophilia. The process was expensive and, because of the large volume of whole [**1569] blood needed as starting material, the possibility of contamination and disease from impurities in the source blood, the large amount of extraneous plasma proteins in the concentrate, and the large volume of concentrate that still had to be administered to the patient, there has been a continuing search for improvement. The record reflects the difficulties, over decades of research, in isolating and studying Factor VIII:C. Scripps reports that Genentech's scientists had been working in the field and had not isolated human Factor VIII:C in sufficient purity and amount to conduct successful characterization experiments.

At the Scripps Clinic & Research Foundation, Dr. Zimmerman and Dr. Fulcher were studying Factor VIII:C from human and porcine blood. These scientists succeeded in isolating and, for the first time, characterizing Factor VIII:C, by a process of chromatographic [**5] absorption of the Factor VIII:C complex using monoclonal antibodies specific to Factor VIII:RP, followed by separation of the Factor VIII:C. n3 Monoclonal antibodies are produced by the cloned copies of a single hybridoma cell. A hybridoma is a hybrid cell that is immortal: that is, it does not die as do normal cells, but continues to reproduce clones that in turn produce a specific antibody. As described in the R '011 patent, the hybridoma was made by fusing a mouse spleen cell that produced the desired antibody to Factor VIII:RP, with a mouse cancer cell, which contributed the immortality. The patent describes the method of assay for clones producing

antibodies to VIII:RP, their isolation, and preparation of the monoclonal antibodies for use as the immunoadsorbent.

----- Footnotes -----

n3 Drs. Zimmerman and Fulcher characterized the Factor VIII:C using a technique described as SDS-gel ("SDS" stands for sodium dodecyl sulfate) electrophoresis and production of a precipitating heterologous antibody. This work was reported in Fulcher and Zimmerman, *Proc. Nat'l Acad. Sci. USA*, "Characterization of the Human Factor VIII Procoagulant Protein with a Heterologous Precipitating Antibody", Vol. 79, pp. 1648-52, March, 1982. It is not disputed that this is the first time that human Factor VIII:C was sufficiently pure to be characterized scientifically, and that the Zimmerman/Fulcher characterization is now the generally recognized "fingerprint" of Factor VIII:C.

----- End Footnotes-----

[**6]

The claimed process whereby the Factor VIII:C/VIII:RP complex is separated from the other materials in blood, followed by separation of the VIII:C from the VIII:RP, is described in the R '011 patent and was summarized by Scripps as follows:

The first step involves the application of a solution containing Factor VIII complex (Factor VIII:C/Factor VIII:RP) to a column packed with agarose beads. Attached to the beads is a monoclonal antibody to Factor VIII:RP. The monoclonal antibody binds and immobilizes the Factor VIII:RP part of the Factor VIII complex while the non-Factor VIII materials simply pass through the column. A calcium salt solution is then applied to break the bond between the Factor VIII:C and the Factor VIII:RP. The Factor VIII:C is eluted from the column while the Factor VIII:RP remains bound to the antibody.

The procedure produces purified but dilute Factor VIII:C:

After this first step the Factor VIII:C is highly purified, but dilute. A second step to concentrate the Factor

VIII:C solution may then be performed. This involves absorbing the Factor VIII:C on an aminohexylagarose column. The Factor VIII:C on the aminohexyl column is then eluted with a very small [**7] amount of calcium salt solution, resulting in a highly concentrated solution of highly purified Factor VIII:C.

The potency and activity n4 of the fractions obtained by this technique were summarized by Scripps as follows:

[*1570] When the Factor VIII:C is eluted from either type of column it is collected serially in a number of small, individual portions called "fractions." When the Factor VIII:C is eluted from the monoclonal antibody column, for example, the initial fractions will have little VIII:C. The VIII:C increases as the Factor VIII:C is released. After the majority of Factor VIII:C has been released, the later fractions will contain decreasing amounts.

Table I in the Zimmerman patent contains an analysis of two individual fractions. Patent Fraction 3 has a potency of 1172 units/ml and a specific activity of 2294 units/mg. Patent Fraction 4 is from another experiment and has a potency of 545 units/ml and a specific activity of 2370 units/mg.

Issues raised in this litigation concern purified Factor VIII:C and the reliability and reproducibility of the process, as these aspects relate to the validity, enforceability, and infringement of the R '011 patent claims.

----- Footnotes -----

n4 "Potency" refers to the amount of activity in a given volume of solution. For example, if 1000 units of Factor VIII:C activity were dissolved in 1 milliliter (ml) of water, the potency of the solution would be 1000 units/ml.

"Specific activity" refers to the number of units of activity for a given mass of protein. For example, if 1000 units of Factor VIII:C activity were present in 1/2 milligram (mg) of protein, the specific activity would be 2,000 units/mg.

One "Unit" is defined as the activity present in 1 ml of normal plasma.

----- End Footnotes-----

[**8]

The Claims

The claims in suit are product-by-process claims 13, 14, 17, 18, and 34, and product claims 24-29. Claim 13 is representative of the product-by-process claims:

13. Highly purified and concentrated human or porcine VIII:C prepared in accordance with the method of claim 1.

Claim 1 is:

1. An improved method of preparing Factor VIII procoagulant activity protein comprising the steps of

- (a) adsorbing a VIII:C/VIII:RP complex from a plasma or commercial concentrate source onto particles bound to a monoclonal antibody specific to VIII:RP,
- (b) eluting the VIII:C,
- (c) adsorbing the VIII:C obtained in step (b) in another adsorption to concentrate and further purify same,
- (d) eluting the adsorbed VIII:C, and
- (e) recovering highly purified and concentrated VIII:C.

Product claims 24-29 were added by reissue, and are the focus of most of the controversy:

24. A human VIII:C preparation having a potency in the range of 134 to 1172 units per ml, and being substantially free of VIII:RP.

25. A human VIII:C preparation of claim 24, wherein the VIII:C concentration is at least 160,000 fold purified relative to VIII:C in plasma. n5

26. A human VIII:C preparation of claim 24, [*9] wherein the ratio of VIII:C to VIII:RP is greater than 100,000 times the ratio in plasma.

27. A human VIII:C preparation of claim 24, wherein said VIII:C is isolated from VIII:C/VIII:RP and 90-100 percent of the VIII:RP has been removed.

28. A human VIII:C preparation having a specific activity greater than 2240 units/mg.

29. A human VIII:C preparation of claim 28 wherein the potency is in the range of 134 to 1172 units/ml.

----- Footnotes -----

n5 "Fold purification" is the ratio of the specific activity of a protein sample to the specific activity of normal plasma. The Factor VIII:C specific activity of normal human plasma is known to be 0.014 units/mg. Thus the relationship is:

fold purification = specific activity/0.014.

For example, if a Factor VIII:C sample has a specific activity of 2240 units/mg, its fold purification value is 160,000. Stated another way, the sample is 160,000 times purer, as to Factor VIII:C, than normal plasma.

----- End Footnotes -----

Summary Judgment

Summary judgment is a useful procedural tool whereby an unnecessary trial [*10] is avoided when there are no material facts in dispute. However, summary proceedings are not intended to substitute for trial when it is indeed necessary to find material facts. Meyers v. Brooks Shoe, Inc., 912 F.2d 1459, 1461, 16 U.S.P.Q.2d (BNA) 1055, 1056 (Fed. Cir. 1990) ("the factual dispute should be reserved for trial"). A factual question is material if a reasonable jury could return a verdict for the non-moving party based at least in part on its determination of the [*1571] factual question. Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 248, 91 L. Ed. 2d 202, 106 S. Ct. 2505 (1986). In determining whether there is a genuine issue of material fact, the evidence must be viewed in the light most favorable to the opponent of the motion, Poller v. Columbia Broadcasting System, Inc., 368 U.S. 464, 473, 7 L. Ed. 2d 458, 82 S. Ct. 486 (1961), and doubts resolved in favor of the opponent. Cantor, dba Selden Drugs Co. v. Detroit Edison Co., 428 U.S. 579, 582, 49 L. Ed. 2d 1141, 96 S. Ct. 3110 (1976).

A motion for summary judgment must be supported with a sufficient showing to establish that there is no genuine issue of material fact and that the moving party is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(c); Celotex Corp. v. Catrett, 477 U.S. 317, 325, 91 L. Ed. 2d 265, 106 S. Ct. 2548 (1986). The [*11] burden of establishing entitlement to summary disposition is with the movant, with due consideration to the burden of proof. *Id.* When a sufficiently supported motion has been submitted, the burden of coming forward and showing that there is a genuine issue of material fact shifts to the non movant. The Court has observed that "all that is required is that sufficient evidence supporting the claimed factual dispute be shown to require a jury or judge to resolve the parties' differing versions of the truth at trial." Anderson, 477 U.S. at 249 (quoting First National Bank of Arizona v. Cities Service Co., 391 U.S. 253, 288-289, 20 L. Ed. 2d 569, 88 S. Ct. 1575 (1968)). However, "if the evidence is merely colorable, or is not significantly probative, summary judgment may be

granted". Anderson, 477 U.S. at 249-50 (citations omitted).

Scripps and Genentech both argue that certain issues that were decided summarily against each of them were not resolvable on summary judgment in favor of the other, if Rule 56 were correctly applied. We have concluded that the district court was correct in its determination, as to some of the issues in suit, that there were no questions of material fact; but not for all issues. **[**12]** For those issues that could indeed be decided summarily, we have reviewed the decision for correctness as a matter of law. For those issues on which summary judgment was inappropriately granted, we have reversed the grant and remanded for trial.

I

Inequitable Conduct and Enablement

On the basis of statements that the inventors made to the reissue examiner in connection with prosecution of the newly added product claims, issued as claims 24-29 of the R '011 patent, the district court granted Genentech's motion for summary judgment of unenforceability of the claims based on inequitable conduct.

Although the court did not hold the claims invalid for lack of enablement, the issues of enablement and inequitable conduct were intertwined. The "enablement" requirement is set forth in Title 35 as follows:

35 U.S.C. § 112 para. 1. The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same. . . .

The purpose of this provision is to assure **[**13]** that the inventor provides sufficient information about the claimed invention that a person of skill in the field of the invention can make and use it without undue experimentation, relying on the patent specification and the knowledge in the art. See United States v. Teletronics, Inc., 857 F.2d 778, 785, 8 U.S.P.Q.2d (BNA) 1217, 1223 (Fed. Cir. 1988), cert. denied, 490 U.S. 1046, 109 S. Ct. 1954, 104 L. Ed. 2d 423 (1989).

During prosecution of the reissue application the patent examiner had raised various questions under § 112, relating to the purity of the Factor VIII:C that was the subject of the proposed product claims.

Communications from the inventors covered such matters as the presence of fibrinogen **[*1572]** and fibronectin and their removal by those skilled in the art; variations in chromatographic purification results; and the determination of purity using SDS-gels. The examiner requested a showing of the mathematical relationship between specific activity and fold purification, and other data, which the inventors provided.

The reissue examiner's objection to the scope of the product claims was withdrawn on the inventors' response that they had obtained human Factor VIII:C at "levels closely approaching the theoretical **[**14]** limit". The inventors explained that the difference in fold purification of about 169,000 shown in Table I, and their calculation of the theoretical value of 357,000-fold, was 2-fold, from which the inventors stated that the "specification teaches those skilled in the art the production of essentially pure VIII:C." They explained that the removal of any remaining fibrinogen and fibronectin was within the skill of the art, when these impurities were identified. The examiner, apparently satisfied with the inventors' answers, n6 granted the reissue application with the added product claims as amended.

----- Footnotes -----

n6 The several defendants herein all presented arguments to the examiner, in Protests filed during the reissue proceeding, on why the product claims should not be allowed.

----- End Footnotes-----

The inventors distinguished the case of In re Fisher, 57 C.C.P.A. 1099, 427 F.2d 833, 166 U.S.P.Q. (BNA) 18 (CCPA 1970), which held the open-ended claims there presented unpatentable for lack of enablement of "future compositions having potencies far in excess of those obtainable **[**15]** from his teachings plus ordinary skill". *Id.* at 839, 166 U.S.P.Q. at 24. Open-ended claims are not inherently improper; as for all claims their appropriateness depends on the particular facts of the invention, the disclosure, and the prior art. They may be supported if there is an inherent, albeit not precisely known, upper limit and the specification enables one of skill in the art to approach that limit. See Fisher, supra.

While Genentech argues that the issue is whether the inventors misrepresented the purity of their Factor VIII:C, Scripps points out that the claims do not require 100% pure VIII:C. The product-by-process

claims all refer to "highly purified and concentrated" VIII:C, and the product claims contain limitations that are met by less than 100% pure VIII:C: for example, that the VIII:C is "at least 160,000 fold purified relative to VIII:C in plasma" (claim 25), that "the ratio of VIII:C to VIII:RP is greater than 100,000 times the ratio in plasma" (claim 26), that the VIII:C product has a potency of 134-1172 units/ml (claim 24) or a specific activity of over 2400 units/mg (claim 28), and is substantially free of VIII:R (claims 24-27). Indeed, the district court [*16] did not find that all these claim limitations depended on the criticized representations about purity that were made to the examiner. However, the court found that the inventors' statements about the purity of the product were unsupported by evidence, and on this basis adjudged all the claims unenforceable for inequitable conduct.

The court referred to a Declaration by Drs. Zimmerman and Fulcher, during prosecution of the reissue application, that "we have achieved purified VIII:C at levels very near what we believe to be the theoretical values with the claimed process." The court found that "Drs. Zimmerman and Fulcher made crucial factual assertions, for the purpose of reversing the Examiner's initial rejection of the open-ended purity claims, for which they had no factual support." The court stated at the hearing that the inventors made statements about purity for which they did not have evidence:

THE COURT: . . . and without implying improper motives it is an issue [purity] on which the inventors did not seem to have evidence but without evidence they created the -- well, you say they made a square statement saying that almost always will you get pure VIII:C when, in fact, they [*17] didn't know that you would almost always get pure VIII:C.

The district court expressed its concern about the inventors' knowledge of the reliability of the process:

THE COURT: Mr. Feiler, I'm not questioning that they got pure C, they have [*1573] gotten lots of pure C. What they did not know was what is the probability of getting VIII:C every time you run one of these columns. What percentage of the fractions that come out will be pure VIII:C. They just didn't know.

This reasoning is reflected in the court's finding:

The undisputed evidence shows that (1) only some of the fractions appeared to be free of fibronectin while others were not, (2) the inventors were unable to quantify how much fibronectin the stream of the product from the column contained, and (3) the fraction on which the patent

application (Table I) was based contained up to 50% fibronectin.

Scripps, 707 F. Supp. at 1557, 11 U.S.P.Q.2d at 1196.

Scripps stated that the inventors' statements to the examiner were justified, that the inventors believed them to be correct, that there was evidence before the district court that the inventors obtained gels showing essentially pure Factor VIII:C, and that the inventors obtained [*18] immunological tests showing no evidence of fibronectin or fibrinogen. Scripps argued that the inventors had the good faith belief that they had enabled the preparation of pure Factor VIII:C, and referred to evidence of contemporaneous correspondence from Dr. Zimmerman to other scientists that "We believe that purification of the human VIII:C is essentially complete". There were declarations filed with the district court, of Dr. Katzmann (a scientist at the Mayo Clinic) and Dr. Hrinda (a scientist at Rorer), that the inventors had obtained essentially pure Factor VIII:C. Dr. Katzmann also explained that Factor VIII:C activity can vary in samples having the same degree of purity; Genentech's data showed the same effect. There was deposition testimony on tests by Dr. Fulcher, showing no fibronectin.

Genentech asserts that the inventors deliberately withheld an analysis of the Table I material after the examiner requested it, and misrepresented that the impurities were "trace" when in fact the materials described in the specification contained 50% fibrinogen and fibronectin. Scripps responds that the requested analysis of the Table I material was indeed provided, that the examiner understood and [*19] was not misled by the inventors' statements about purity, that additional evidence showed that the representations made to the examiner were scientifically correct, and that, in all events, the statements were made in good faith.

The district court placed substantial weight on Dr. Zimmerman's deposition testimony that "trace contaminants" fibrinogen and fibronectin remained, that he "did not have numbers for upper limits", and that "it is a trivial matter to remove the fibrinogen and fibronectin once they have been identified". The court commented that "Dr. Fulcher in her deposition was unable to quantify [the term 'essentially pure'] or the term 'highly purified'", and remarked that it is "impossible to extrapolate from one or several Laurells [tests of a fraction of the column stream] as to the degree of purity of the entire output". The court criticized these scientific facts as legal inadequacies.

The court appeared to require greater scientific precision than did any of the scientists whose

testimony was presented. The statute, however, is directed to persons of skill in the field of the invention. Indeed, Genentech provided no evidence that one of skill in the field of this [*20] invention could not make and use a product satisfying all the limitations of the claims, by following the inventors' disclosure and the knowledge of the art. Neither evidence nor expert opinion to this effect was offered.

The materiality of a representation, and whether the representation was made with intent to deceive or mislead, are the two essential factual predicates to determination of inequitable conduct. Modine Mfg. Co. v. Allen Group, Inc., 917 F.2d 538, 541, 16 U.S.P.Q.2d (BNA) 1622, 1624 (Fed. Cir. 1990). The district court stated that the "three elements of inequitable conduct" are "material prior information, chargeable to applicant, not disclosed to the PTO". Scripps, 707 F. Supp. at 1557, 11 U.S.P.Q.2d at 1196. Notably missing is the element of [*1574] intent, essential as a matter of law to a ruling of inequitable conduct. See Kingsdown Medical Consultants, Ltd., v. Hollister, Inc., 863 F.2d 867, 876, 9 U.S.P.Q.2d (BNA) 1384, 1392 (Fed. Cir. 1988). Conduct that requires forfeiture of all patent rights must be deliberate, and proved by clear and convincing evidence. While Genentech argues that absence of reference by the court to intent does not mean that the court did not find intent, [*21] the court's remark that it was "without implying improper motives [to the inventors]" contravenes this argument. Even were the inventors' statements concerning purity in error, a finding of disputed fact that is not appropriate on summary judgment, the absence of a finding of intent to deceive or mislead the examiner precludes summary judgment of inequitable conduct. See KangaROOS U.S.A., Inc. v. Caldor, Inc., 778 F.2d 1571, 1573, 228 U.S.P.Q. (BNA) 32, 35-36 (Fed. Cir. 1985) (a disputed question of intent to deceive is not appropriate for summary resolution).

The grant of partial summary judgment of unenforceability of the R '011 claims for inequitable conduct is reversed.

Scripps had filed a cross-motion for summary judgment on this issue. This does not, of itself, require adjudication in its favor. United States v. Fred A. Arnold, Inc., 573 F.2d 605, 606 (9th Cir. 1978); accord, Cram v. Sun Insurance Office, Ltd., 375 F.2d 670, 673-74 (4th Cir. 1967) ("The fact that both sides moved for summary judgment does not establish that there is no issue of fact and require that judgment be granted for one side or the other"). These disputed factual questions of materiality and intent, which [*22] depend on the assessment of scientific facts as well as on the credibility of witnesses, are not

amenable to summary resolution. The issue is remanded for trial.

II

35 U.S.C. § 251

A

The R '011 patent is a reissue of Patent No. 4,361,509 ("the '509 patent"), granted on November 20, 1982. Genentech challenged the adequacy of the patentee's reason for seeking reissue, stating that this reason was insufficient in terms of 35 U.S.C. § 251. On this ground the district court granted Genentech's motion for partial summary judgment of invalidity of claims 17, 18, 24-29, and 34.

Although there were factual aspects debated by the parties, they are not material to the question of the legal adequacy of the patentee's reason for requesting reissue. That is a question of law, and the facts material to that question were not in dispute. The matter could have been, and was, decided summarily. See Paperless Accounting, Inc. v. Bay Area Rapid Transit Sys., 804 F.2d 659, 662, 231 U.S.P.Q. (BNA) 649, 651 (Fed. Cir. 1986), cert. denied, 480 U.S. 933, 94 L. Ed. 2d 764, 107 S. Ct. 1573 (1987) ("These facts are not in dispute, though their legal significance is. Thus the basis on which the district court decided the question was amenable [*23] to summary judgment"). However, the district court erred in its conclusion of law.

The reissue statute provides in part:

35 U.S.C. § 251. Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Commissioner shall . . . reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application. . . . No new matter shall be introduced into the application for reissue.

In accordance with 37 C.F.R. § 1.175(a)(5) and (a)(3) the applicant for reissue must "specify[] the errors relied upon, and how they arose or occurred," and must "distinctly specify[] the excess or insufficiency in the claims"; and in accordance with 37 C.F.R. § 1.175(a)(6) the applicant must declare the absence of deceptive intention.

The principal error that the inventors sought to cure was the claiming of "less than [they] had a right to claim in the patent" due to the omission of product claims. The '509 patent contained only process [*1575] and product-by-process [*24] claims. n7 In the reissue application inventors Zimmerman and

Fulcher declared that they had always viewed the Factor VIII:C product as their invention, pointing out that the '509 specification stated that it was an object of their invention to produce highly purified Factor VIII:C.

----- Footnotes -----

n7 Broadened claims by reissue must be applied for within two years of grant of the original patent. 35 U.S.C. § 251. This requirement was met.

----- End Footnotes -----

An error of law is not excluded from the class of error subject to correction in accordance with the reissue statute. Although attorney error is not an open invitation to reissue in every case in which it may appear, see *In re Weiler*, 790 F.2d 1576, 1579, 229 U.S.P.Q. (BNA) 673, 675 (Fed. Cir. 1986) ("not every event or circumstance that might be labeled 'error' is correctable by reissue"), the purpose of the reissue statute is to avoid forfeiture of substantive rights due to error made without intent to deceive. See generally *Ball Corp. v. United States*, 729 F.2d 1429, 1939 n.28, [****25**] 221 U.S.P.Q. (BNA) 289, 296 n.28 (Fed. Cir. 1984) (the reissue statute "is based on fundamental principles of equity and fairness").

When the statutory requirements are met, reissuance of the patent is not discretionary with the Commissioner; it is mandatory ("shall"). See *In re Handel*, 50 C.C.P.A. 918, 312 F.2d 943, 948, 136 U.S.P.Q. (BNA) 460, 464 (CCPA 1963) ("the whole purpose of the statute, so far as claims are concerned, is to permit limitations to be added to claims that are too broad or to be taken from claims that are too narrow").

Genentech does not dispute that error was made, and does not challenge the principle of the availability of product claims to the purified Factor VIII:C. Further, Genentech does not assert that the attorneys' initial view of the unavailability of product claims involved any deceptive intention. The district court, holding that there was insufficient reason for reissue, appeared to interpret § 251 as requiring a showing that the error in claiming the product could not have been avoided, in order to be eligible for cure. This is not the framework of the reissue statute.

The law does not require that no competent attorney or alert inventor could have avoided the error sought to be corrected by reissue. [****26**] Failure of the attorney to claim the invention sufficiently broadly is "one of the most common sources of defects". *In re Wilder*, 736

F.2d 1516, 222 U.S.P.Q. (BNA) 369 (Fed. Cir. 1984), cert. denied, 469 U.S. 1209, 84 L. Ed. 2d 323, 105 S. Ct. 1173 (1985):

An attorney's failure to appreciate the full scope of the invention is one of the most common sources of defects in patents. The fact that the error could have been discovered at the time of prosecution with a more thorough patentability search or with improved communication between the inventors and the attorney does not, by itself, preclude a patent owner from correcting defects through reissue.

Id. at 1519, 222 U.S.P.Q. at 371.

Subjective intent is not determinative of whether the applicants erred in claiming less than they had a right to claim. *In re Mead*, 581 F.2d 251, 255, 198 U.S.P.Q. (BNA) 412, 416 (CCPA 1978). "Intent to claim" is not the criterion for reissue, and has been well described as "but judicial shorthand, signifying a means of measuring whether the statutorily required error is present." *In re Weiler*, 790 F.2d 1576, 1581, 229 U.S.P.Q. (BNA) 673, 676 (Fed. Cir. 1986) (emphasis in original). The statutory standard of reissuable error is objective, and [****27**] does not require proof of subjective state of mind:

Determining what protection [an inventor] intended to secure by [an] original patent for the purposes of § 251 is an essentially factual inquiry confined to the objective intent manifested by the original patent.

In re Rowand, 526 F.2d 558, 560, 187 U.S.P.Q. (BNA) 487, 489 (CCPA 1975) (emphasis in original).

On undisputed facts, the inventors established that they had claimed less than they had a right to claim, that they had [***1576**] done so in error, and that there was not deceptive intention. The application for reissue fully complied with the statutory and regulatory requirements. n8

----- Footnotes -----

n8 The patent examiner and the PTO Office of Quality Review found that the applicant adhered to correct reissue practice, pursuant to Manual of Patent Examining Procedure § 1456 (Rev. 3, 1986).

----- End Footnotes-----

As a matter of law, reissue claims 17, 18, 24-29, and 34 are not invalid on this ground. The grant of partial summary judgment is reversed. On remand, partial summary judgment shall be entered for [**28] Scripps on this ground.

B

The district court had also held the reissue product claims invalid for inadequate support in the specification for their open-ended scope, referring to changes that Drs. Zimmerman and Fulcher made in the text of the specification during the drafting process. For example, they changed "virtually pure" to "highly purified"; and inserted "largely" before "free of contaminants". This is an issue of enablement, which is not challenged by Genentech; but it also raises questions of claim interpretation in light of the specification. In view of the several disputed questions of material fact underlying these issues, see Part I *ante* and Part V *post*, summary judgment on this ground was improper, and the grant thereof is reversed. This issue, also, requires trial.

III

Anticipation

The district court held, on cross-motions for summary judgment, that "it had been proved by clear and convincing evidence" that claims 24, 26, and 27 were invalid for anticipation, 35 U.S.C. § 102(b), based on subject matter described in a 1979 dissertation by Robert B. Harris entitled "Isolation and Characterization of Low Molecular Weight, Non-Aggregated Antihemophilic Factor [**29] from Fresh Human Plasma".

A

Anticipation is a question of fact. Shatterproof Glass Corp. v. Libbey-Owens Ford Co., 758 F.2d 613, 619, 225 U.S.P.Q. (BNA) 634, 637 (Fed. Cir.), *cert. dismissed*, 474 U.S. 976, 88 L. Ed. 2d 326, 106 S. Ct. 340 (1985). To make such finding on summary judgment, the court must determine that no facts material to the question are disputed; or that even if all material factual inferences are drawn in favor of the non-movant, there is no reasonable basis on which the non-movant can prevail. Cooper v. Ford Motor Co., 748 F.2d 677, 679, 223 U.S.P.Q. (BNA) 1286, 1288 (Fed. Cir. 1984). The standard of proof that would have to be met at trial must be considered. Anderson, 477 U.S. at 257.

Invalidity for anticipation requires that all of the elements and limitations of the claim are found within

a single prior art reference. Carella v. Starlight Archery and Pro Line Co., 804 F.2d 135, 138, 231 U.S.P.Q. (BNA) 644, 646 (Fed. Cir. 1986); RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 U.S.P.Q. (BNA) 385, 388 (Fed. Cir. 1984). There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention.

It is [**30] sometimes appropriate to consider extrinsic evidence to explain the disclosure of a reference. Such factual elaboration is necessarily of limited scope and probative value, for a finding of anticipation requires that all aspects of the claimed invention were already described in a single reference: a finding that is not supportable if it is necessary to prove facts beyond those disclosed in the reference in order to meet the claim limitations. The role of extrinsic evidence is to educate the decision-maker to what the reference meant to persons of ordinary skill in the field of the invention, not to fill gaps in the reference. See Studiengesellschaft Kohle, mb H v. Dart Industries, Inc., 726 F.2d 724, 727, 220 U.S.P.Q. (BNA) 841, 842 (Fed. Cir. 1984) (although additional references may serve to reveal what a reference would have meant to a person of ordinary skill, it is error to build "anticipation" on a combination [**1577] of these references). If it is necessary to reach beyond the boundaries of a single reference to provide missing disclosure of the claimed invention, the proper ground is not § 102 anticipation, but § 103 obviousness. Indeed, a publication on the Harris dissertation was included [**31] in the prior art statement filed by Scripps and was a cited reference under § 103.

B

In the summary judgment proceedings the parties filed three successive declarations of Dr. Harris, each explaining his dissertation. In the first declaration, filed by Miles, Inc., Harris stated that he isolated "a low molecular weight antihemophilic factor". In his second ("supplemental") declaration, filed by Scripps, Harris described this factor as not a naturally occurring substance, and of low specific activity:

6. The material I identified as low molecular weight antihemophilic factor (LMW-AHF) was not a naturally occurring substance. The material of my dissertation is the result of reacting plasma with a reducing agent called dithiothreitol (DTT) prior to purification. The reduced plasma is run through an initial purification step, and is then chemically reacted with radioactively labeled iodoacetamide (<14>C-IAA). This reduced and alkylated material was the LMW-AHF reported in

my dissertation. After further purification, I obtained a maximum specific activity of 59.1 [units]/mg.

In the third Harris declaration, filed by Miles, Harris stated that his dissertation accurately reports [**32] on my work in which I was able to, and did, obtain a human VIII:C preparation having a potency of 193 [units]/ml and being substantially free of VIII:RP, the ratio of VIII:C to VIII:RP being greater than 100,000 times the ratio in plasma.

The third Harris declaration was cited by the district court in support of its finding of anticipation.

The parties debate whether Harris' statement in his second declaration that his product was chemically changed from naturally occurring VIII:C, is contradicted by the statement in his third declaration that he obtained a human VIII:C preparation. Scripps also points out that neither the potency value nor the ratio of VIII:C to VIII:RP described in the third Harris declaration appears in the Harris dissertation. Nor does the gel pattern evidence on which the district court found that:

Harris also based his identification of his preparation upon sodium dodecyl sulfate polyacrylamide gel electro-phoresis (SDS-PAGE) tests [the same tests used by Dr. Fulcher]. While Harris' gel patterns do not match the gel pattern found by Dr. Fulcher, there is no evidence that if he had VIII:C, it would necessarily have the gel pattern found by Dr. Fulcher.

[**33] *Scripps*, 707 F. Supp. at 1551 n.6, 11 U.S.P.Q.2d at 1190 n.6. Further, this finding that human Factor VIII:C, if obtained by Harris, would not necessarily have the "fingerprint" gel pattern of Dr. Fulcher, was not simply an adverse factual inference, improper on summary judgment; it was a finding of scientific fact contrary to the evidence. This finding also appears to be inconsistent with the court's finding that Dr. Harris had obtained purified Factor VIII:C because he based his identification on the same tests and gel patterns taught by Zimmerman and Fulcher. Also contradicting the court's conclusion was Scripps' evidence that the human Factor VIII:C SDS-gels of the inventors, the defendants, and non-parties to the litigation were the same, and that Dr. Harris' gel patterns were different.

Scripps contends that the court also erred in taking Dr. Harris' assertion in his third declaration that he obtained a potency of 193 units/ml and then construing the dissertation so as to find support for it. The court

found support for this potency by combining (1) the potency of 2.7 units/ml reported by Harris for the sample in his Figure 9 with (2) the 71-fold concentration of an unidentified [**34] sample described on page 56 of the dissertation, and then multiplying 2.7 by 71 to obtain a potency of 191.7 units/ml. This combination of data is contrary to the statement of Dr. Harris in his second declaration that:

[*1578] 15. Neither is there any information from which to infer that the LMW-AHF recovered in the experiment represented by Figure 9 was the subject of [the page 56] lyophilization and reconstitution experiment.

Scripps also states that the maximum potency that the dissertation disclosed was 10 units/ml. Even crediting Dr. Harris' assertion that the ratio of AHF (antihemophilic factor) to VWF (von Willebrand factor) may have been as high as 100,000:1, Scripps calculated that this would only increase the potency of the concentrated sample on Harris' page 56 to a maximum of 10.0 units/ml. A sample having the potency of 191.7 units/ml, the value found by the district court, was calculated by Scripps to have a theoretical ratio of no less than 1,917,000:1, over 19 times higher than that asserted by Dr. Harris in his dissertation. Scripps thus argues that the court's findings are contrary to the evidence. We need not decide the correctness of these calculations and their premises, [**35] for it is clear that these issues, on which there was conflicting evidence, were not subject to summary resolution.

To the extent that apparent inconsistencies among the three Harris declarations raise questions of credibility and weight, whether of witness or of interpretation of scientific data, they were improperly resolved on summary judgment. *Agosto v. INS*, 436 U.S. 748, 756, 56 L. Ed. 2d 677, 98 S. Ct. 2081 (1977); *Poller*, 368 U.S. at 473. In patent cases, questions by affidavit is disfavored. See *Poller v. Columbia Broadcasting System, Inc.*, 368 U.S. 464, 473, 7 L. Ed. 2d 458, 82 S. Ct. 486 (1961); *United States v. Fred A. Arnold, Inc.*, 573 F.2d 605, 606 (9th Cir. 1978). Trial by document is an inadequate substitute for trial with witnesses, who are subject to examination and cross-examination in the presence of the decision-maker. *Sartor v. Arkansas Natural Gas Corp.*, 321 U.S. 620, 628, 88 L. Ed. 967, 64 S. Ct. 724 (1944).

Scripps also raised the question of whether the Harris dissertation was enabling and placed the purported anticipatory teaching of purified Factor VIII:C in possession of the public. Scripps pointed out that Data in Harris' third declaration, on which the court relied, do not appear in his dissertation or in any other reference. [**36] See *Akzo N.V. v. United States Int'l*

Trade Comm'n, 808 F.2d 1471, 1479, 1 U.S.P.Q.2d (BNA) 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909, 96 L. Ed. 2d 382, 107 S. Ct. 2490 (1987) (anticipatory reference must be enabling); *In re Brown*, 51 C.C.P.A. 1254, 329 F.2d 1006, 1011, 141 U.S.P.Q. (BNA) 245, 249 (CCPA 1964). The need to consider this issue, on disputed factual premises, also negates the propriety of the grant of summary judgment based on anticipation.

The grant of partial summary judgment of invalidity of claims 24, 26, and 27 for anticipation by the Harris dissertation is reversed. The issue is not amenable to summary disposition, and is remanded for trial.

IV

Best Mode

The district court granted Genentech's motion for summary judgment that claims 13, 14, 17, 18, 24-29, and 34 are invalid for failure to comply with the "best mode" requirement of 35 U.S.C. § 112:

§ 112. The specification shall . . . set forth the best mode contemplated by the inventor of carrying out his invention.

Compliance with the best mode requirement is a question of fact, and invalidity for failure of compliance requires proof by clear and convincing evidence that the inventor knew of and concealed a better mode of carrying out the invention [**37] than was set forth in the specification. *See Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1369, 1379, 231 U.S.P.Q. (BNA) 81, 90 (Fed. Cir. 1986), *cert. denied*, 480 U.S. 947, 94 L. Ed. 2d 792, 107 S. Ct. 1606 (1987).

The concealment asserted by Genentech relates to the monoclonal antibodies that bind the Factor VIII complex in the initial step of separation from plasma. Genentech did not dispute that the specification describes the inventors' preferred method of obtaining these monoclonal antibodies. [*1579] The specification describes the process, starting with injection into mice of the commercial Factor VIII concentrate, to produce antibodies against Factor VIII:RP; the preparation of the hybridomas and their screening for the desired antibodies; and the method of evaluation of the antibody's ability to bind Factor VIII:RP in the presence of salt solution that disassociates Factor VIII:C. The specification describes the properties for which the antibodies were screened, *viz.* to obtain a monoclonal antibody to Factor VIII:RP, of the IgG class, which binds greater than 90% of the VIII:RP out of plasma or concentrate, and which remains bound to the VIII:RP during saline elution of Factor VIII:C.

None of this [**38] was criticized by Genentech. There was no charge of concealment of special manipulations, or undisclosed techniques. Genentech's argument is primarily that because of the laborious nature of the process of screening monoclonal antibodies, the inventors should have voluntarily placed in a depository and made available to the public the antibody to Factor VIII:RP designated 2.2.9, which was the first effective antibody obtained by Scripps' screening, and was used by Scripps in carrying out the claimed invention.

Scripps states that the procedures in the specification produce monoclonal antibodies having the characteristics set forth in the specification, that the process of obtaining these antibodies was fully disclosed, that the data in Table I are for the 2.2.9 antibody, and that the 2.2.9 antibody was not concealed. Scripps agreed that the 2.2.9 antibody was indeed the first that had the described properties, and states that three out of the first seven antibodies screened had these properties, all obtained by routine and admittedly time-consuming procedures. It was not disputed that the inventors obtained the 2.2.9 antibody by following the procedures in the patent specification, [**39] and that these were the inventors' preferred procedures.

The district court found that the inventors concealed the 2.2.9 antibody, and that this antibody was the best mode of carrying out the invention. The court did not hold that deposit of the 2.2.9 antibody was required, although the court stated that a person of skill in the art would not have known "where to obtain it". The court made no other finding relating to concealment.

A deposit was not required by the PTO during examination of either the '509 or the R '011 patents. *See* M.P.E.P. § 608.01(p)(C)(3). Nor does Genentech argue that deposit was obligatory. No protester raised the issue of deposit in connection with the reissue application. Although Genentech suggests that Scripps should have made a deposit voluntarily, failure to do so can not constitute legal or factual basis for patent invalidity.

Despite the extensive attorney argument, there were no material facts in dispute. There was no evidence by Genentech that the antibodies used by Drs. Zimmerman and Fulcher differed from those obtainable according to the process described in the specification. The laborious nature of this work was recognized in *Hybritech, supra*, [**40] and again in *In re Wands*, 858 F.2d 731, 737-38, 8 U.S.P.Q.2d (BNA) 1400, 1406-07 (Fed. Cir. 1988). In *Wands* this court, considering the question of enablement, declined to require the deposit of antibody samples that could be

obtained by screening following the procedures in the specification.

Genentech had argued to the PTO, in its Protest against the reissue application, that the process is "easily" carried out to produce "high affinity monoclonal antibodies":

There are numerous references demonstrating the ease with which high affinity monoclonal antibodies could be obtained to Factor VIII:R[P].

In the context of best mode, on facts similar to those at bar, this court's holding in *Hybritech* settled the issue:

The only evidence even colorably relating to concealment is testimony by various Hybritech employees that sophisticated, competent people perform the screening and that the screening process is labor-intensive and time-consuming. *It is not plausible that this evidence amounts to proof of concealment* of a best mode for [*1580] screening or producing monoclonal antibodies for use in the claimed '110 process, and therefore we are of the firm conviction that the district court's [*41] finding that the best mode requirement was not satisfied is clearly erroneous.

Hybritech, 802 F.2d at 1385, 231 U.S.P.Q. at 94 (emphasis added). Applying *Hybritech* to the undisputed facts, a finding of concealment can not be supported. The claims were incorrectly held invalid on this ground.

As a matter of law, we reverse the grant of partial summary judgment that claims 13, 14, 17, 18, 24-29, and 34 are invalid for failure to meet the best mode requirement. We remand with instructions that partial summary judgment be entered for Scripps on this ground.

V

Infringement

The district court found the R '011 product claims 24, 25, 28, and 29 literally infringed, explaining that "Human factor VIII:C as claimed in the [product claims] therefore applies to any Factor VIII:C preparation, regardless of how produced, having the same material structural and functional characteristics as the plasma-derived preparation." The court did not distinguish between plasma-derived and recombinantly-produced human Factor VIII:C. n9 Genentech does not challenge this ruling as applied to plasma-derived VIII:C.

----- Footnotes -----

n9 In accordance with the recombinant procedure, the human Factor VIII:C gene is identified, isolated, and inserted into a host cell, where it is replicated and from which Factor VIII:C is expressed and excreted into a culture medium. From this medium it is further purified using, *inter alia*, monoclonal antibodies to Factor VIII:C.

----- End Footnotes -----

[**42]

A

Genentech appeals the district court's grant of Scripps' motion for summary judgment that the product claims are infringed by Genentech's recombinantly-produced human Factor VIII:C. Genentech states that the product claims should be construed, as a matter of law, to avoid infringement by recombinant VIII:C. Alternatively, Genentech argues that infringement is avoided by application of the reverse doctrine of equivalents. These two theories of non-infringement require different analytic approaches.

In "claim construction" the words of the claims are construed independent of the accused product, in light of the specification, the prosecution history, and the prior art. Of course the particular accused product (or process) is kept in mind, for it is efficient to focus on the construction of only the disputed elements or limitations of the claims. However, the construction of claims is simply a way of elaborating the normally terse claim language: in order to understand and explain, but not to change, the scope of the claims.

We described the workings of claim construction in *Tandon Corp. v. Int'l Trade Comm.*, 831 F.2d 1017, 1021, 4 U.S.P.Q.2d 1283, 1286 (Fed. Cir. 1987):

Claim [*43] interpretation is a question of law, having factual underpinnings. When the meaning of key terms of claims is disputed . . . extrinsic evidence may be adduced including testimony of witnesses, and reference may be had to the specification, the prosecution history, prior art, and other claims.

Genentech argues that the term "a human VIII:C preparation" in the R '011 product claims should be construed as limited to the Factor VIII:C obtained by

separation from plasma. In essence, Genentech argues that these claims should be construed as carrying an inherent process limitation, on the basis that Scripps did not invent human Factor VIII:C, or discover its structure, or its properties as the coagulant factor in blood, but simply the process of purifying it to a higher degree of purity than was heretofore available. However, Genentech also states that it is not challenging the propriety of product claims to Factor VIII:C; and it did not do so before the district court. While judicial attention has on occasion focused on the patentability of claims in this context, *see, e.g., In re Bergstrom*, 57 C.C.P.A. 1240, 427 F.2d 1394, 166 U.S.P.Q. (BNA) 256 (CCPA 1970), Genentech, by conceding that [*1581] the product claims were [*44] appropriately granted, presents inconsistent legal arguments. Genentech has not supported, as a matter of law, its requested claim construction.

B

The so-called "reverse doctrine of equivalents" is an equitable doctrine invoked in applying properly construed claims to an accused device. Just as the purpose of the "doctrine of equivalents" is to prevent "pirating" of the patentee's invention, *Graver Tank & Mfg. Co. v. Linde Air Prod. Co.*, 339 U.S. 605, 607, 608, 85 U.S.P.Q. (BNA) 328, 330, 94 L. Ed. 1097, 70 S. Ct. 854, *reh'g denied*, 340 U.S. 845, 95 L. Ed. 620, 71 S. Ct. 12 (1950), so the purpose of the "reverse" doctrine is to prevent unwarranted extension of the claims beyond a fair scope of the patentee's invention.

The reverse doctrine of equivalents flows from the Supreme Court's statement in *Graver Tank* that an accused article may avoid infringement, even if it is within the literal words of the claim, if it is "so far changed in principle from a patented article that it performs the same or a similar function in a substantially different way." 339 U.S. at 608-09, 85 U.S.P.Q. at 330. Application of the doctrine requires that facts specific to the accused device be determined and weighed against the equitable scope of the claims, which [*45] in turn is determined in light of the specification, the prosecution history, and the prior art.

The record contained evidence of the properties of plasma-derived and recombinantly produced VIII:C, which was presented primarily by Scripps in connection with its proofs of infringement. There was deposition testimony that there were differences between VIII:C from plasma and VIII:C obtained by recombinant techniques; a Scripps' witness described the products as "apples and oranges", referring specifically to stability and formulations. The parties disputed, in connection with the summary judgment motions, the capabilities of the respective processes in terms of the purity and specific activities that were

enabled for the respective products. The record on this point is extensive.

Genentech argues that its product is equitably seen as changed "in principle", particularly when viewed in the context of the prior art. Genentech asserts that the specific activities and purity that are obtainable by recombinant technology exceed those available by the Scripps process; an assertion disputed by Scripps, but which if found to be correct could provide -- depending on the specific facts of similarities [*46] and differences -- sufficient ground for invoking the reverse doctrine. These aspects were not discussed by the district court.

The principles of patent law must be applied in accordance with the statutory purpose, and the issues raised by new technologies require considered analysis. Genentech has raised questions of scientific and evidentiary fact that are material to the issue of infringement. Consideration of extrinsic evidence is required, and summary judgment is inappropriate. *See C.R. Bard, Inc. v. Advanced Cardiovascular Systems, Inc.*, 911 F.2d 670, 673, 15 U.S.P.Q.2d (BNA) 1540, 1542 (Fed. Cir. 1990).

The grant of summary judgment of infringement of claims 24, 25, 28, and 29 is reversed. The issue requires trial.

VI

Inducement to Infringe

The district court held that Genentech induced Cutter Laboratories to infringe claims 24, 25, 28, and 29 of the R '011 patent, 35 U.S.C. § 271(b), through the use of both plasma-derived and recombinant Factor VIII:C. The court held:

There is no question that Genentech delivered to Cutter materials found to have infringed, including recombinant and plasma-derived human Factor VIII:C, with the intent that Cutter itself would [develop recombinant [*47] Factor VIII:C]. . . . There is also no doubt that Genentech intended Cutter to use plasma-derived Factor VIII:C manufactured by both Genentech and Cutter which has been found to infringe.

[*1582] *Scripps*, 666 F. Supp. at 1394, 3 U.S.P.Q.2d at 1493. The facts of the relationship between Genentech and Cutter were undisputed.

Genentech states that the district court made no specific finding of direct infringement by Cutter, a predicate to a finding of inducement to infringe. Cutter

is a division of Miles, a defendant herein, and is subject to the district court's finding of infringement. Thus the court's ruling on inducement was correct, as a matter of law. Subject to our holding in Part V, the decision of the district court on this issue is affirmed.

VII

Inequitable Conduct based on the Meyer Abstract

Genentech appeals the district court's grant of summary judgment that Scripps did not engage in inequitable conduct, during examination of the application that led to the '509 patent, based on a reference authored by Meyer, Obert, Zimmerman, and Edgington entitled *Monoclonal Antibodies Specific for Factor VIII from Cellular Hybrids*, No. 395 ("the Meyer abstract").

The district court [**48] observed that the Meyer abstract was cumulative to the complete Meyer paper it summarized:

The Meyer abstract was also cited in a paper authored, *inter alia*, by Dr. Meyer herself that was submitted by Scripps to the PTO as reference RS. . . . In contrast to the Meyer abstract, which is only one paragraph long, reference RS is 27 pages in length and much more elaborate in its disclosure

Scripps, 666 F. Supp. at 1399-1400, 3 U.S.P.Q.2d at 1496. A reference that is simply cumulative to other references does not meet the threshold of materiality that is predicate to a holding of inequitable conduct. Halliburton Co. v. Schlumberger Technology Corp., 925 F.2d 1435, 1440, 17 U.S.P.Q. 2d (BNA) 1834 (Fed. Cir. 1991).

The Meyer abstract was before the patent examiner who, according to Genentech, discovered it "on his own". When a reference has been considered by the examiner, it is not controlling how it came to the examiner's attention. The complete Meyer paper, and several other references, cited the Meyer abstract. Genentech argues that Scripps should nonetheless have brought the Meyer abstract to the examiner's specific attention, in addition to having listed the complete Meyer [**49] paper in Scripps' prior art statement. When a reference was before the examiner, whether through the examiner's search or the applicant's disclosure, it can not be deemed to have been withheld from the examiner.

Genentech presses the argument that the district court erred because the Meyer abstract was a "statutory bar", by which Genentech explains that it was published

more than a year before the patent's filing date. Genentech does not explain how this was error, for the district court, like the PTO, treated as prior art both the 27-page Meyer paper and the Meyer abstract. Genentech's argument that the full paper "was not effective prior art" is contrary to law and fact, for it was published before the filing date of Scripps' '509 patent application and Scripps did not attempt to antedate the Meyer paper. It is thus immaterial when the Meyer abstract was published.

Genentech also charged Scripps with inequitable conduct because Scripps originally sought claims to its monoclonal antibodies to Factor VIII:RP, and cancelled these claims after the examiner required Scripps to provide comparative data with the monoclonal antibodies described in the Meyer abstract and other references. [**50] While Genentech argues that obtaining such data was not the burden that Scripps said it was, this is irrelevant to the issue of inequitable conduct. An applicant has the absolute right to decline to do work suggested by the PTO, and to withdraw claims that had been presented for examination, without incurring liability for inequitable conduct.

The district court reviewed the Meyer abstract's content and found, without challenge on this appeal, that:

[**1583] The Meyer et al. abstract contains no disclosure of the purification of Factor VIII:C. The Meyer et al. abstract contains no disclosure indicating that any of the monoclonal antibodies could be bound to substrate particles to form an immunoadsorbent for isolation and purification of VIII:C from the VIII:C/VIII:RP complex.

The court concluded:

Lacking such disclosure, the Meyer et al. abstract does not appear material to the examination of the claims that were presented in applicants' original application and issued in Patent No. 4,361,509.

Scripps, 666 F. Supp. at 1398, 3 U.S.P.Q.2d at 1495. No error is ascribed to this conclusion. A reference that is material only to withdrawn claims can not be the basis of a holding of inequitable [**51] conduct. Kimberly-Clark Corp. v. Johnson & Johnson Co., 745 F.2d 1437, 1457, 223 U.S.P.Q. (BNA) 603, 616-17 (Fed. Cir. 1984).

The party with the burden of proof of inequitable conduct must meet the clear and convincing standard. FMC Corp. v. Manitowoc Co., 835 F.2d 1411, 1417 n.11, 5 U.S.P.Q.2d (BNA) 1112, 1117 n.11 (Fed. Cir.

1987). Genentech did not offer evidence or legal argument whereby, even drawing all factual inferences in its favor, this standard could be met at trial, as to either materiality of the Meyer abstract, or intent to deceive or mislead. The district court's grant of partial summary judgment of no inequitable conduct based on the Meyer abstract is affirmed.

VIII

Infringement of the Product-by-Process Claims

Scripps appeals the district court's refusal to grant its motion for summary judgment of infringement of the R '011 product-by-process claims 13, 14, 17, 18, and 34. The district court denied Scripps' motion under Rule 59(e) to amend the judgment to rule on this question. Genentech argues that this denial is not appealable, and has moved for dismissal. Looking to the law of the Ninth Circuit, an appeal from a final judgment may include challenges to "all rulings which [**52] produced the judgment". *Munoz v. Small Business Administration*, 644 F.2d 1361, 1364 (9th Cir. 1981). See *Moran v. Aetna Life Insurance Co.*, 872 F.2d 296, 301 (9th Cir. 1989) (denial of a summary judgment motion is appealable after entry of final judgment); 10 C. Wright, A. Miller, and M. Kane, *Federal Practice & Procedure* § 2715 (2d ed. 1983). The issue is reviewable, but on an undeveloped record we consider only the questions of law.

Scripps charges that Genentech's recombinantly-produced Factor VIII:C infringes the product-by-process claims, either literally or by application of the doctrine of equivalents. The district court remarked that the product-by-process claims would not be infringed unless the same process were practiced. Scripps correctly points out that this statement appears to diverge from our precedent, recognizing that this precedent arose in the context of patent prosecution, not patent infringement. *E.g.*, *In re Thorpe*, 777 F.2d 695, 227 U.S.P.Q. (BNA) 964 (Fed. Cir. 1985) (holding that prior art pertinent only to product is proper ground for rejecting product-by-process claims); *In re Brown*, 59 C.C.P.A. 1036, 459 F.2d 531, 535, 173 U.S.P.Q. (BNA) 685, 688 (CCPA 1972) (in product-by-process [**53] claims the patentability of the product must be established independent of the process); *In re Bridgeford*, 53 C.C.P.A. 1182, 357 F.2d 679, 682 n.5, 149 U.S.P.Q. (BNA) 55, 58 n.5 (CCPA 1966) (recognizing that some courts in infringement litigation have construed product-by-process claims as limited to the particular process, but holding that patentability is determined independent of the process). In determining patentability we construe the product as not limited by the process stated in the claims. Since claims must be construed the same way for validity and for infringement, the correct reading of product-

by-process claims is that they are not limited to product prepared by the process set forth in the claims. Thus, these claims are subject to an infringement analysis similar to that described in Part V, [**1584] *ante*. Infringement of the product-by-process claims may be considered at trial.

IX

Attorney Fees

The district court held that this was an exceptional case under 35 U.S.C. § 285, 724 F. Supp. 690, apparently due to the court's rulings on inequitable conduct and failure to comply with the best mode. Holdings under § 285 are reviewed for abuse of the trial court's discretionary authority, considering the court's findings [**54] and conclusions and any other appropriate factors. See *Reactive Metals & Alloys Corp. v. ESM, Inc.*, 769 F.2d 1578, 1583, 226 U.S.P.Q. (BNA) 821, 824 (Fed. Cir. 1985). In view of our reversal of the grants of summary judgment on the issues of best mode and inequitable conduct, the award of attorney fees flowing therefrom must be vacated. See *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1238, 224 U.S.P.Q. (BNA) 418, 426 (Fed. Cir. 1985) (reversing ground for holding case exceptional and accompanying award of attorney fees).

X

Other Issues

We have not repeated all the arguments and issues raised by both sides, including charges of frivolity, misstatement, and worse. Encumbered by the summary nature of the proceedings, neither scientific nor evidentiary truth has risen easily to the surface. However, we *DENY* Scripps' motion for sanctions against Genentech for filing a frivolous cross-appeal, for some of the issues raised were not clearly hopeless in law and fact. We also *DENY* each side's motions to strike various materials filed and to dismiss issues raised by the other.

Costs

Each party shall bear its costs.

AFFIRMED IN PART, REVERSED IN PART,
VACATED IN PART, AND REMANDED [**55]

DONALD G. RICHARDSON, Plaintiff/Appellant, v. SUZUKI MOTOR CO., LTD. and U.S. SUZUKI MOTOR CORPORATION, Defendants/Cross-Appellants, KAWASAKI HEAVY INDUST. LTD., KAWASAKI MOTORS CORP., YAMAHA MOTOR CO., LTD., YAMAHA MOTOR CORP., U.S.A., KAYABA INDUSTRY CO., LTD. and KAYABA INDUSTRY CO., Defendants

Nos. 87-1497, 87-1498, 87-1502, 88-1083, 88-1084

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

868 F.2d 1226; 1989 U.S. App. LEXIS 1684; 9 U.S.P.Q.2D (BNA) 1913

February 16, 1989, Decided

SUBSEQUENT HISTORY: [1]**

As amended March 8, 1989; Rehearing Denied March 29, 1989.

PRIOR HISTORY: Appealed from: U.S. District Court for the Central District of California, Judge Gray.

CASE SUMMARY

PROCEDURAL POSTURE: Parties appealed and cross-appealed from the judgment of the United States District Court for the Central District of California which involved issues of patent validity, infringement, breach of contract, fraud, misappropriation of trade secrets, and several related issues.

OVERVIEW: In an action involving patent validity, infringement, breach of contract, fraud, and misappropriation of trade secrets, jury verdicts held that a valid patent was infringed by defendant and that a majority of plaintiff's claims were not trade secrets. Both parties appealed. The court affirmed in part because a reasonable jury could have found the patent was not invalid on grounds of anticipation since invalidity was not proved by clear and convincing evidence. Furthermore, on correct instructions no reasonable jury could have found that the claimed invention and accused structures were not equivalent, thus infringement was affirmed. Damages for patent infringement were vacated and remanded since improper instruction produced inadequate compensation. The order for a new trial on a trade secret violation was reversed since the district court exceeded the discretionary authority in vacating the jury verdict and ordering a new trial when plaintiff had a prejudicially heavy burden of proving trade secrets. The denial injunction was reversed because irreparable harm was presumed with infringement.

OUTCOME: The judgment was affirmed as to validity, infringement, and as to certain claims for damages. The court reinstated the jury verdict on the issues of fraud and compensatory and punitive

damages. The court reversed the denial of the request for an injunction and remanded for an entry of injunctive relief. The court reversed and remanded on the issue of a jury instruction on willful infringement to be submitted for the jury to decide the issue.

COUNSEL: Theresa A. Middlebrook, Wagner & Middlebrook, of Glendale, California, and Robert Driscoll, Driscoll & Tomich, of Glendale, California, argued for Plaintiff/Appellant. With them on the brief was John E. Wagner.

John A. Fogarty, Kenyon & Kenyon, of New York, New York, argued for Defendants/Cross-Appellants. With him on the brief were Richard S. Gresalfi and Dawn M. DiStefano. Also on the brief were Richard S. Rockwell, of Tustin, California, Duffern H. Helsing and Halina F. Osinski, of Santa Ana, California, of Counsel.

JUDGES: Smith, Circuit Judges, Skelton, Senior Circuit Judge, and Newman, Circuit Judge.

OPINIONBY: NEWMAN

OPINION: [*1229] NEWMAN, Circuit Judge.

This appeal and cross-appeal are from the judgment of the United States District Court for the Central District of California, and involve issues of patent validity, infringement, breach of contract, fraud, misappropriation [*1230] of trade secrets, and several related issues. n1 We affirm in part, reverse in part, vacate in part, and remand. [**2]

----- Footnotes -----

n1 *Richardson v. Suzuki Motors Co. and Suzuki U.S. Motors Corp.*, Nos. CV 80-2589-WPG and CV 82-3826-WPG (C.D. Cal. June 29, 1987 and July 13, 1987).

----- End Footnotes -----

The Invention

The invention that led to this litigation is a motorcycle rear-wheel suspension system that smooths the ride over rough terrain, of interest particularly in off-road motorcycle riding. The roughness of the ride is due to bumps and dips in the terrain, transmitted from the wheels to the frame. An optimum rear-wheel suspension will maintain tire contact with the ground despite deflection by irregularities, will avoid "bottoming out" (an unsafe rising of the suspension), yet will achieve a smooth ride without reduction in safety. In 1974 even the best available suspensions did not maintain adequate tire contact with the ground in conjunction with attempts to eliminate bottoming out.

In mid-1974 Donald G. Richardson, a young mechanic in California, devised a solution to the problem, a modified suspension system that he installed in his own [**3] motocross motorcycle. Richardson replaced the conventional two-spring shock absorber suspension system with a system consisting of a single shock absorber plus a linkage consisting of a bell crank and connecting rod. This linkage generated a "rising rate" n2 -- a characteristic critical to the issue -- and produced a far superior ride, even as it eliminated the dangerous bottoming out. Richardson testified about his first ride, at a hilly construction site near his house, as "utopia. I mean it was incredible"; over hard bumps it was "uncanny because it was so smooth"; "the rear end didn't kick up. It just didn't bottom out and stayed down"; an "unbelievable feeling".

----- Footnotes -----

n2 "Rising rate" was described by witnesses as follows: "as the suspension travels upward, the resistance to upward travel will increase"; and it "gets stiffer as the wheel moves up toward the vehicle or moves upward in the frame."

----- End Footnotes -----

On November 25, 1974 Richardson filed a United States patent application on his invention, and on September 23, 1975 the [**4] application issued as United States Patent No. 3,907,332 (hereinafter the '332 or Richardson patent). Patent claim 9, which incorporates claim 1, is the only claim in suit. Claims 1 and 9 follow:

1. A suspension for two wheeled vehicles comprising:

a frame for the vehicle comprising a generally closed shape including upper and lower portions and

a swing arm pivotally connected to the lower portion of said frame;

said swing arm comprising a pair of arms rotatably supporting a wheel about a horizontal axis generally at the end of said swing arm;

the pivotal mounting of said arm to said frame being about a generally horizontal axis whereby said wheel is both rotatable about its own horizontal axis and deflectable in a generally vertical direction about the axis of said swing arm;

spring means having a first end pivotally secured to said frame;

a link member including an intermediate point pivotally mounted on said frame about an axis, parallel to the axis of said swing arm at a point spaced therefrom;

pivotal connection means between said link member and the second end of said spring;

a bar pivotally connected at one end to said swing arm and at the opposite [**5] end to said link member at a position spaced from said spring connection;

said spring, bar, swing arm and link connected whereby deflection of said swing arm displaces said bar and rotates said link member to compress said spring.

9. The combination in accordance with claim 1 wherein said assembly provides a rising spring rate as a function of deflection of said swing arm.

Figure 2 of the '332 patent specification is illustrative:

[*1231] [SEE ILLUSTRATION IN ORIGINAL]

As the rear wheel is deflected upward by bumps in the terrain, the swing arm (32) that is pivotally connected at (34) to the motorcycle frame (21) rotates upward, pushing the compression rod (41) into the bell crank (42) that is pivotally secured (31) at its intermediate point to the motorcycle frame. The bell crank rotates on its pivot (31) and compresses, downward against the frame, a spring (46) that is pivotally connected at one end (45) to the bell crank, and at its other end (52) to the motorcycle frame. The interaction of these interconnected parts increases the force on the spring,

increasing the rate of resistance to deflection of the wheel with increased movement of the wheel. This [**6] varying resistance is the "rising spring rate" of claim 9, and is illustrated in Figure 5 of the '332 patent:

[*1232] [SEE ILLUSTRATION IN ORIGINAL]

The Contract with Suzuki

In October 1978 Richardson entered into a one year Option and License Agreement with the Suzuki Motor Co., Ltd. of Japan ("Suzuki").

The Agreement gave Suzuki the exclusive right to test and evaluate Richardson's suspension, and the exclusive option to acquire an exclusive license to the '332 patent and Richardson's "proprietary technical information, know-how, inventions, and use data", collectively defined in the Agreement as the "Licensed Rights."

The Agreement required Richardson to disclose to Suzuki all technical information, know-how, inventions, use data and design specifications for his suspension, that he possessed or that he acquired during the option period. Suzuki agreed to preserve all such information in confidence, and not to use any of it "for any purpose other than to evaluate for commercial feasibility of manufacture and marketing during the Option Period." Suzuki agreed that this obligation of confidence continued if Suzuki did not exercise the option. Excepted from the [**7] confidentiality obligation was all information previously known to Suzuki or at any time generally known to the public.

The Agreement required Richardson to make prototypes of his suspension system for Suzuki's evaluation. Richardson installed his suspension in Suzuki's sample 1978 and 1979 model production motorcycles, and disclosed to Suzuki the technical information and know-how that he possessed, including improvements and other information that he developed during this period. He met frequently with Suzuki engineers and other Suzuki personnel in the United States and in Japan to communicate this information and generally to improve performance and to facilitate testing and evaluation.

There was testimony at trial of initial incredulity on the part of Suzuki engineers concerning Richardson's suspension, of Suzuki's past failures in designing a suspension with the desired characteristics, and of Suzuki's favorable response to the performance of Richardson's suspension. The evidence included internal Suzuki documents made while Suzuki was testing Richardson's suspension, stating that it would "take a long time", perhaps three years, for Suzuki to develop a satisfactory suspension. [**8]

In early 1979 Richardson and a colleague Cazort conceived an improvement in the linkage-generated rising rate suspension, which they called the "Alternate Shock Mount" and which they disclosed to Suzuki, accompanied by drawings and blueprints [*1233] made by Cazort. The difference from the structure described in the '332 patent is that in the Alternate Shock Mount the lower end of the spring is pivotally secured to the swing arm which is pivotally secured to the frame, instead of being pivotally secured directly to the frame, resulting in increased strength.

In May 1979 Richardson's first prototype for Suzuki, wherein Richardson, aided by Cazort, installed his suspension in a Suzuki 1978 production model, was successfully tested in Japan. Testimony at trial included statements attributed to Suzuki's test riders that they could see the bumps but not feel them, and other commentary evidencing a highly favorable reaction to Richardson's suspension.

It was a stipulated fact that after these tests Suzuki made the decision to place the linkage-generated rising rate suspension system into production, and started development work for this purpose.

On October 16, 1979 Suzuki filed [**9] a patent application in Japan. The corresponding United States patent, filed on October 8, 1980, claims the Alternate Shock Mount suspension as disclosed by Richardson, and also claims a modification made by Suzuki called the "criss-cross". Suzuki named two of its engineers, Hirohide Tamaki and Manabu Suzuki, as the inventors.

Suzuki twice requested and was granted one-month extensions of its Option and License Agreement with Richardson. In December 1979 Suzuki informed Richardson that it would not exercise the option.

In March 1980 Suzuki began competitive racing in the United States of Suzuki motorcycles using the Alternate Shock Mount suspension, which Suzuki named the "Full Floater". Suzuki met with marked racing success, the Full Floater receiving favorable publicity and high acclaim from the public. Extensive advertising was directed to the Full Floater rising rate suspension. The product achieved widespread commercial success.

Suzuki denied any obligation to Richardson.

Litigation

Richardson brought suit against Suzuki (Japan) and the U.S. Suzuki Motor Corporation in California state court, and was granted a preliminary injunction restraining the Suzuki companies [**10] from breach of the Option and License Agreement and requiring them to comply with the confidentiality terms thereof. At Suzuki's request the state court declined to enforce

the injunction after U.S. Suzuki sued Richardson in federal court, seeking a declaratory judgment of invalidity and non-infringement of Richardson's '332 patent.

In 1982 Richardson filed a patent infringement action against the Suzuki companies and others. (Only the Suzuki companies remain as parties.) Richardson reasserted the state claims of breach of contract, breach of implied covenant of good faith and fair dealing, misappropriation of trade secrets, and fraud, and among other relief requested assignment of the patents obtained by Suzuki on the Alternate Shock Mount. Suzuki counterclaimed for fraud and breach of contract by Richardson, based on asserted invalidity of the '332 patent.

The federal actions were consolidated and tried to a jury. After forty-seven days of a two-part trial the jury gave special verdicts on issues of liability and damages. The district court entered final judgment under Fed. R. Civ. P. 54(b) on the jury verdicts that the '332 patent was not invalid and was infringed by Suzuki, [*11] that nine of Richardson's eleven asserted trade secrets were not trade secrets, and that Richardson was not entitled to assignment of the Tamaki/Suzuki patents on the Alternate Shock Mount. The court also entered final judgment on the jury verdicts of damages for patent infringement and for Suzuki's use of certain of Richardson's information that the jury found were not trade secrets. The court denied prejudgment interest and attorney fees, and refused to grant an injunction.

The district court denied most of the parties' post-trial motions, but granted Suzuki's motion for a new trial on three issues that the jury had decided in favor of [*1234] Richardson, upholding two of the eleven asserted trade secrets, finding fraud on the part of Suzuki, and assessing damages for fraud. The district court then entered a supplemental final judgment for immediate appeal of the issues that the court intended to retry, and certified three specific questions on these and related issues.

I

Validity of Richardson's '332 Patent

Suzuki asserts on appeal the invalidity of claim 9 on grounds of anticipation (35 U.S.C. § 102) and obviousness (35 U.S.C. § 103). [*12] n3 The district court, stating that questions of patent validity must be decided by the court, told the jury that its verdicts on this issue were advisory. Nevertheless the court duly entered the jury verdicts, including the answer YES to the question: "Under the facts and law as you believe that you understand them, do you find Claim 9 of the Richardson Patent to be valid?" The court entertained,

and denied, post-trial motions for judgment n.o.v. and for a new trial on the question of validity. The court also independently decided the question, upholding validity of the '332 patent.

----- Footnotes -----

n3 The additional aspects of adequacy of disclosure (35 U.S.C. § 112) and unenforceability for inequitable conduct, both decided in favor of Richardson, have not been appealed.

----- End Footnotes-----

The record provided to us doesn't show the origin of this discredited procedure of advisory verdicts, or whether either party objected. In *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 895 n.5, 221 USPQ 669, 674 n.5, [*13] (Fed. Cir.), cert. denied, 469 U.S. 857, 83 L. Ed. 2d 120, 105 S. Ct. 187 (1984), we observed that:

The view suggested in *Sarkisian [v. Winn-Proof Corp.]*, 688 F.2d 647, 651, (9th Cir. 1982), cert. denied, 460 U.S. 1052, 103 S. Ct. 1499, 75 L. Ed. 2d 930 (1983)], that a jury verdict on nonobviousness is at best advisory, would make charades of motions for directed verdict or JNOV under Fed. R. Civ. P. 50 in patent cases. These motions apply only to *binding* jury verdicts. . . .

Moreover, use of an advisory jury is limited to actions not triable of right by a jury.

(emphasis in original, citations omitted). In a similar circumstance wherein the trial court and the jury independently decided the same jury question (in that case the question of willfulness of infringement) we remarked that "all fact findings of a jury are non-advisory, unless made in an area expressly removed from jury verdict." *Shiley, Inc. v. Bentley Laboratories, Inc.*, 794 F.2d 1561, 1568, 230 USPQ 112, 115 (Fed. Cir. 1986), [*14], cert. denied, 479 U.S. 1087, 107 S. Ct. 1291, 94 L. Ed. 2d 148 (1987).

It is established that the jury may decide the questions of anticipation and obviousness, either as separate special verdicts or en route to a verdict on the question of validity, which may also be decided by the jury. *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1547, 220 USPQ 193, 197 (Fed. Cir. 1983):

No warrant appears for distinguishing the submission of legal questions to a jury in patent cases from such submissions routinely made in other types of cases. So long as the Seventh Amendment stands, the right to a jury trial should not be rationed, nor should particular issues in particular types of cases be treated differently from similar issues in other types of cases.

See also, e.g., *Vieau v. Japax, Inc.*, 823 F.2d 1510, 1515, 3 USPQ2d 1094, 1098 (Fed. Cir. 1987); *Verdegaal Brothers Inc. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1052 [**15] (Fed. Cir.), cert. denied, 484 U.S. 827, 108 S. Ct. 95, 98 L. Ed. 2d 56 (1987); *Data Line Corp. v. Micro Technologies, Inc.*, 813 F.2d 1196, 1200, 1 USPQ2d 2052, 2054 (Fed. Cir. 1987); *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1571, 1 USPQ2d 1081, 1085 (Fed. Cir. 1986); *DMI, Inc. v. Deere & Co.*, 802 F.2d 421, 425-27, 231 USPQ 276, 279-80 (Fed. Cir. 1986); *Mainland Industries, Inc. v. Standal's Patents Ltd.*, 799 F.2d 746, 747-48, 230 USPQ 772, 773 (Fed. Cir. 1986); *Trans-World Mfg. Corp. v. Al* [**1235] *Nyman & Sons, Inc.*, 750 F.2d 1552, 1560, 224 USPQ 259, 263 (Fed. Cir. 1984); *Quaker City Gear Works, Inc. v. Skil Corp.*, 747 F.2d 1446, 1454-55, 223 USPQ 1161, 1165-66 (Fed. Cir. 1984), cert. denied, 471 U.S. 1136, 86 L. Ed. 2d 694, 105 S. Ct. 2676 (1985); *Weinar v. Rollform Inc.*, 744 F.2d 797, 805, 223 USPQ 369, 372 (Fed. Cir. 1984), cert. denied, 470 U.S. 1084, 85 L. Ed. 2d 143, 105 S. Ct. 1844 (1985); *Perkin-Elmer Corp.*, 732 F.2d at 894-95, 221 USPQ at 674; *Envirotech Corp. v. Al George, Inc.*, 730 F.2d 753, 758, 221 USPQ (BNA) 473, 477 (Fed. Cir. 1984); [**16] *Railroad Dynamics, Inc. v. A. Stucki Company*, 727 F.2d 1506, 1512-13, 220 USPQ 929, 935 (Fed. Cir.), cert. denied, 469 U.S. 871, 83 L. Ed. 2d 150, 105 S. Ct. 220 (1984); *White v. Jeffrey Mining Mach. Co.*, 723 F.2d 1553, 1558, 220 USPQ 703, 705 (Fed. Cir. 1983) ("Submission of such a question of law [obviousness] to a jury, accompanied by appropriate instructions, is proper."), cert. denied, 469 U.S. 825, 83 L. Ed. 2d 49, 105 S. Ct. 104 (1984). See generally H.T. Markey in *On Simplifying Patent Trials*, 116 F.R.D. 369, 370 (1987) ("There is neither reason nor authority for employing in a patent trial procedures and practices different from those employed in any other civil trial. Indeed, reason and authority mandate the contrary.")

Although the district court and the jury reached the same result, the standards by which appellate courts review the judgment differ, depending on whether it arose from a jury or a bench trial. *District of Columbia*

v. Pace, 320 U.S. 698, 701, 88 L. Ed. 408, 64 S. Ct. 406, [**17] (1944) ("findings of fact by an equity court and the verdict of a jury have from time immemorial been subject to different rules of finality"). When the judgment arises from a jury verdict, the reviewing court applies the reasonable jury/substantial evidence standard: a standard that gives greater deference to the judgment simply because appellate review is more limited, compared with review of a trial judge's decision. *Id.* at 702. As summarized in *Lavender v. Kurn*, 327 U.S. 645, 653, 90 L. Ed. 916, 66 S. Ct. 740, (1946), "the appellate court's function is exhausted when that evidentiary basis [of the jury's verdict] becomes apparent, it being immaterial that the court might draw a contrary inference or feel that another conclusion is more reasonable." See generally M.B. Louis, *Allocating Adjudicative Decision Making Authority Between the Trial and Appellate Levels: A Unified View of the Scope of Review, The Judge/Jury Question, and Procedural Discretion*, 64 N.C. L. Rev. 993 (1986).

The parties do not take a position on the district court's procedure, but appear to recognize that the issue of validity was properly for jury [**18] determination, for neither party refers to the district court's explanation of its independent determination of the question of obviousness.

In the interest of reaching an end to this protracted litigation, we have reviewed the judgment on the terms on which it reaches us. We have determined first whether Suzuki met its burden of showing on appeal that no reasonable jury could have reached the verdict of "valid" on the evidence before it. *Allen Organ Co. v. Kimball Int'l, Inc.*, 839 F.2d 1556, 1566, 5 USPQ2d 1769, 1777 (Fed. Cir.), cert. denied, 488 U.S. 850, 109 S. Ct. 132, 102 L. Ed. 2d 104 (1988); *DMI, Inc. v. Deere & Co.*, 802 F.2d 421, 425, 231 USPQ 276, 278 (Fed. Cir. 1986); *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 618-19, 225 USPQ 634, 636 (Fed. Cir.), cert. dismissed, 474 U.S. 976, 106 S. Ct. 340, 88 L. Ed. 2d 326 (1985). Then, on the premise that the parties may have waived their right to a jury trial on this question by failure to object to the district court's procedure, we have considered whether the district court's independent judgment of validity may be [**19] sustained, on the standards applicable thereto. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566-68, 1 USPQ2d 1593, 1595-97 (Fed. Cir.) (obviousness determination in bench trial reviewed as a question of law based on underlying facts), cert. denied, 481 U.S. 1052, 107 S. Ct. 2187, 95 L. Ed. 2d 843 (1987).

The court correctly instructed the jury that invalidity must be proved by clear and convincing evidence,

referring to the presumption of validity. *Perkin-Elmer Corp.*, 732 F.2d at 894, 221 USPQ at 674; *Jamesbury Corp. v. Litton Industrial Products, Inc.*, 756 F.2d 1556, 1559, 225 USPQ 253, 255 (Fed. Cir. 1985); *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1360, 220 USPQ 763, 771 (Fed. Cir.), cert. denied, 469 U.S. 821, 83 L. Ed. 2d 41, 105 S. Ct. 95 (1984).

A. Anticipation

The district court correctly instructed the jury that an invention is anticipated [**20] if the same device, including all the claim limitations, is shown in a single prior art reference. Every element of the claimed invention must be literally present, arranged as in the claim. *Perkin-Elmer Corp.*, 732 F.2d at 894, 221 USPQ at 673; *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771-72, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026, 79 L. Ed. 2d 687, 104 S. Ct. 1284 (1984). The identical invention must be shown in as complete detail as is contained in the patent claim. *Jamesbury Corp.*, 756 F.2d at 1560, 225 USPQ at 256; *Connell*, 722 F.2d at 1548, 220 USPQ at 198.

As prior art, Suzuki relied on the motorcycle suspensions described in certain patents to Downs and Warner, and on the race car wheel suspensions described for Tyrrell and McLaren race cars in two Road and Track magazine articles. Witnesses explained to the jury the similarities and differences between the invention of the '332 patent and each prior art reference. For example, the Downs suspension has a spring element that is rigidly attached to the motorcycle frame and does not pivot as is required by [**21] claim 9 of the '332 patent. The Warner reference shows a suspension having a bell crank that is pivotally mounted to the motorcycle frame but not at an intermediate point, whereas Richardson requires a mid-point pivot of the bell crank to the frame. Neither Downs nor Warner describes a rising rate. The magazine articles describe a four wheel racing car suspension system having a linkage-generated variable rising rate incorporating a bell crank, but instead of the swing arm of Richardson's motorcycle suspension, the race car systems use an A-shaped arm mounted to the side of an upright wheel; and the bell crank and linkage in the race car system is located beside the wheel, rather than in front of the wheel as in Richardson's motorcycle system.

Witnesses testified that rising rate in motorcycles had previously been obtained only by progressively wound springs and gas operated shock absorbers. Suzuki argued that rising rate is inherent in the Downs and Warner motorcycle suspensions and expressly described for race cars in the magazine articles, and

also that rising rate is merely a statement of function, and thus should not be a basis for distinction from the prior art.

The jury [**22] found that Downs did not "disclose each and every element of the Richardson Claims 1 and 9 or their equivalent". For the Warner reference, the jury could not reach a unanimous verdict on this same question, but answered NO to the question whether "the respective elements of Warner function in substantially the same way as the corresponding elements in Richardson to produce substantially the same results". The jury found that the race car suspensions did "disclose each and every element of the Richardson Claims 1 and 9 or their equivalent", but did not reach a unanimous verdict as to whether they "function in substantially the same way as the corresponding elements in Richardson to produce substantially the same results."

The jury had erroneously been instructed that anticipation may be shown by equivalents, a legal theory that is pertinent to obviousness under Section 103, not to anticipation under Section 102. *Lewmar Marine, Inc. v. Barient, Inc.*, 827 F.2d 744, 747-48, 3 USPQ2d 1766, 1768 (Fed. Cir. 1987), cert. denied, 484 U.S. 1007, 108 S. Ct. 702, 98 L. Ed. 2d 653 (1988); *Connell*, 722 F.2d at 1548, 220 USPQ at 198. The jury [**23] requested a definition of "equivalent" during its deliberations, and was given the Webster's dictionary definition "corresponding or virtually identical, especially in effect or function." This narrow definition, which does not accord with that of *Graver Tank & Mfg. Co. v. Linde Air [**1237] Products Co.*, 339 U.S. 605, 608, 94 L. Ed. 1097, 70 S. Ct. 854, (1950), may have minimized the legal error in the instructions. In any event, the erroneous inclusion of equivalents in the anticipation inquiry favored Suzuki. The jury nonetheless answered YES to the special verdict: "Under the facts and law as you believe that you understand them, do you find Claim 9 of the Richardson Patent to be valid?"

On the totality of the evidence and in light of the jury instructions and answers, we conclude that a reasonable jury could have found that the patent was not invalid on grounds of anticipation. *Perkin-Elmer Corp.*, 732 F.2d at 894, 221 USPQ at 673-74 (review of presumed jury finding that anticipation not proved, based on jury verdict of validity).

Reviewing the analysis and decision of the district court, based on the same prior art, we discern no clear [**24] error in the court's conclusion that claim 9 was not invalid.

We affirm that claim 9 was not proved invalid on the ground of anticipation.

B. Obviousness

The issue of obviousness was vigorously litigated, Suzuki relying on the same Downs and Warner patents and magazine articles. The record shows that there was extensive testimony concerning the differences between Richardson's suspension and the prior art. Suzuki argued at trial, and repeats on this appeal, that these differences are trivial mechanical expedients.

The jury, among its special verdicts on the *Graham* factors, found that a person of ordinary skill in the pertinent art could be any of: (1) a motorcycle mechanic without formal technical education, (2) a person with experience in working on suspension systems for racing automobiles, but without formal technical training, (3) suspension system instructors, (4) professional motorcycle riders, and (5) someone possessing above-average mechanical skills. Suzuki argues that such a person is of generally high mechanical skill, and to such a person Richardson's rising rate motorcycle suspension would have been an obvious "adaption" of the race car suspension systems, **[**25]** which "suggests itself quite plainly, since Downs and Warner incorporate bell cranks in their respective suspensions."

The jury was unable to reach a unanimous verdict on the question of whether a person of the level of skill found by the jury, presented with the problem and being familiar with all the prior art including these four specific references, but unaware of Richardson's device, would be "led to do" what Richardson did. In response to the ultimate question, as we have observed, the jury reached the unanimous verdict that "Under the facts and law as you believe that you understand them", claim 9 was "valid". The district court entered judgment on the jury verdicts, independently held the patent valid, and denied Suzuki's motions for judgment n.o.v. and for a new trial on the issue of validity.

The question for the jury was whether the challenger met the burden of proving invalidity by clear and convincing evidence; and the question on review is whether reasonable jurors could have concluded that the challenger failed to meet that burden. *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1571, 1 USPQ2d 1081, 1085 (Fed. Cir. 1986); *Perkin-Elmer Corp.*, 732 F.2d at 894-95, 221 USPQ at 674. **[**26]** The jury's lack of unanimity on certain special verdicts can reasonably be taken to mean, as the district court held, that invalidity had not been proved by clear and convincing evidence.

Our review shows that there was substantial evidence on which reasonable jurors could have concluded that claim 9 had not been proved invalid for obviousness, and thus reached the verdict of "valid". Although the

district court erred in its belief that obviousness could only be presented to the jury for an advisory verdict, we may view the court's agreement with the jury verdict of validity as supporting the court's denial of Suzuki's post-trial motions for judgment n.o.v. and for a new trial. *Perkin-Elmer Corp.*, 732 F.2d at 895, 221 USPQ at 674-75. However it is viewed procedurally, no reversible error **[*1238]** has been shown in the court's conclusion that obviousness had not been proved and that claim 9 was not invalid.

The judgment of validity is affirmed.

II

Infringement

Richardson bore the burden of proving infringement by a preponderance of the evidence. The district **[**27]** court correctly stated that the jury was the finder of the fact of infringement.

The jury rendered special verdicts as to the Suzuki motorcycles before it, Model M having the Richardson/Cazort Alternate Shock Mount and Model C having the "criss-cross" connection added by Suzuki, as follows:

9(a). Do defendant Suzuki's motorcycles of the Model M type . . . infringe Claim 9 of the plaintiff's patent?

Answer: YES, WITH THE RISING RATE

9(b). Do defendant Suzuki's motorcycles of the Model C type . . . infringe Claim 9 of the plaintiff's patent?

Answer: YES, WITH THE RISING RATE

In subparts 9(a)(2) and 9(b)(2) of the special verdict the jury answered YES to the question whether the Suzuki motorcycles produce substantially the same rising rate as taught in Richardson's patent.

The principal question on appeal is the meaning and effect of the jury answers to subparts (1) of the special verdict, which were directed "in particular" to the Alternate Shock Mount and the criss-cross modifications:

9(a)(1). In particular, is the defendant's linkage equivalent to the plaintiff's, bearing in mind that the bottom of the spring in the **[**28]** former is affixed to the swing arm rather than to the frame?

Answer: NO

9(b)(1). In particular, is the defendant's linkage equivalent to the plaintiff's, in light of the "criss-cross" of the connecting rods and the bell crank in the defendant's model, as well as the spring attachment to the swing arm, as compared with the plaintiff's Claim 9?

Answer: NO

The district court entered judgment of infringement in favor of Richardson and denied post-trial motions by both sides, including a motion by Richardson to reopen the record in order to present evidence on the doctrine of equivalents. The district court stated that the jury verdicts mean that "infringement is limited to 'rising rate'" and that the Suzuki and Richardson linkages are not equivalent.

Suzuki argues that special verdicts 9(a)(1) and 9(b)(1) require judgment of non-infringement; or, as a minimum, that these verdicts are inconsistent with the verdicts of infringement in 9(a) and 9(b), such that a new trial is required of the entire issue. Richardson states that the verdicts can be understood, when viewed in light of the jury instructions, in a way that supports the judgments of infringement. Suzuki did **[**29]** not request a new trial on the basis of inconsistent verdicts at the time the judgments were entered, while Richardson moved, unsuccessfully, to amend or delete verdicts 9(a)(1) and 9(b)(1). Each party asserts that any inconsistency should be resolved in its favor.

The Ninth Circuit, in accordance with the general rule, requires trial and appellate courts to seek reconciliation of apparently inconsistent verdicts:

When faced with a claim that verdicts are inconsistent, the court must search for a reasonable way to read the verdicts as expressing a coherent view of the case, and must exhaust this effort before it is free to disregard the jury's verdict and remand the case for a new trial.

Toner v. Lederle Laboratories, 828 F.2d 510, 512 (9th Cir. 1987), cert. denied, 485 U.S. 942, 108 S. Ct. 1122, 99 L. Ed. 2d 282 (1988) (citing Gallick v. Baltimore & Ohio R.R., 372 U.S. 108, 119, 9 L. Ed. 2d 618, 83 S. Ct. 659, (1963), also citing Atlantic & Gulf Stevedores, Inc. v. Ellerman Lines, Ltd., 369 U.S. 355, 364, 7 L. Ed. 2d 798, 82 S. Ct. 780, **[**30]** (1962) and Blanton v. Mobil Oil Corp., 721 F.2d 1207, 1213, (9th Cir. 1983), cert. denied, 471 U.S. 1007, 85 L. Ed. 2d 166, 105 S. Ct. 1874 **[*1239]** (1985)). See also Allen Organ Co., 839 F.2d at 1563, 5 USPQ2d at 1775 (the appellate court must make every effort to harmonize the jury's answers).

The district court did not find the special verdicts inconsistent, apparently in the belief that the jury limited infringement to the rising rate provision of claim 9 but not the other claim clauses. This accords with the court's statement to the jury that the infringement was "minor" because it was limited to the rising rate. This interpretation pleased neither party. If

we have correctly understood it, it is incorrect as a matter of law.

"We are bound to find the special verdicts consistent if we can do so under a fair reading of them." Toner, 828 F.2d at 512. A fair reading of the special verdicts results from simply applying the rule that "the consistency of the jury verdicts must be considered in light of the judge's **[**31]** instructions to the jury". Toner, 828 F.2d at 512. The instructions on infringement, and the specific questions asked by special verdict, were designed to resolve the issues raised at trial. There was testimony on both sides of Suzuki's assertion that its suspension was not the same as Richardson's because it produced a different rising rate. We referred *supra* to special verdicts 9(a)(2) and 9(b)(2):

9(a)(2). Does defendant's Model M produce rising rate substantially the same as the rising rate produced under the teachings of the plaintiff's patent?

Answer: YES

9(b)(2). Does defendant's Model C produce rising rate substantially the same as the rising rate produced under the teachings of the plaintiff's patent?

Answer: YES

Another special verdict in the infringement section asked the jury:

11. Does claim 9 of the Richardson Patent describe the invention of a rising rate in terms of what the invention will do rather than in terms of physical arrangement?

Answer: NO

We conclude that the answer "yes, with the rising rate" in verdicts 9(a) and 9(b) is the jury's response to Suzuki's argument, rather than as a finding **[**32]** that only the rising rate claim limitation, and no other, is embodied in the Suzuki suspensions.

We discern no support in the record for the district court's conclusion that verdicts 9(a) and 9(b) meant that the rising rate was the only area of infringement. Structure corresponding to every element of every clause of claims 1 and 9 was identified by witnesses as embodied in the accused motorcycles. There was no real dispute that of the nine or eleven elements in these claims (depending on how counted), all but one were literally present. The dispute centered on one element, the attachment of the spring in the claim clause "spring means having a first end pivotally secured to said frame", since this was the clause affected by the modifications of the Alternate Shock Mount and the criss-cross. In the Alternate Shock Mount, as we have discussed, the spring is pivotally secured to a swing arm that in turn is pivotally secured to the frame,

instead of being pivotally secured directly to the frame as is shown in the '332 specification.

Richardson argues that the spring can be either directly or indirectly pivotally secured to the frame, without avoiding literal infringement of the claim. [**33] Richardson alternatively argues that on a correct definition of the doctrine of equivalents, citing *Graver Tank*, 339 U.S. at 608, these securements are equivalent because the structures are substantially the same and perform substantially the same function in the same way.

The jury had been given the dictionary definition that "equivalent" means "corresponding or virtually identical, especially in effect or function". This definition was reinforced by the phrasing of verdicts 9(a)(1) and 9(b)(1), wherein the question itself instructed the jury on the difference between the linkages, while remaining silent on the similarities.

This presentation was highly prejudicial. Indeed, these verdicts well illustrate the truism that the way a question is [**1240] asked can direct the answer. "The decision to submit interrogatories, and the precise language in which they are couched, can have an untoward effect on a verdict, if certain elements of the trial or the evidence are thereby overly emphasized in the jury's mind." *Weinar v. Rollform Inc.*, 744 F.2d 797, 809, 223 USPQ 369, 376 (Fed. Cir. 1984), [**34] cert. denied, 470 U.S. 1084, 85 L. Ed. 2d 143, 105 S. Ct. 1844 (1985).

Further, and equally prejudicial, special verdicts 9(a)(1) and 9(b)(1) isolated this specific claim element so that it was removed from the perspective that is obtained only when the claimed invention is viewed in its entirety. See, e.g., *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1363, 219 USPQ (BNA) 473, 482 (Fed. Cir. 1983). We recently reemphasized in *United States Steel Corp. v. Phillips Petroleum Co.*, 865 F.2d 1247 slip op. at 13-14 (Fed. Cir. 1989), in discussing *Graver Tank*, that there is no error in considering "the principle of the claimed invention".

A device that embodies improvements on a claimed structure does not automatically avoid the reach of the claim. See, e.g., *Atlas Powder Co. v. E. I. du Pont de Nemours & Co.*, 750 F.2d 1569, 1580, 224 USPQ (BNA) 409, 417 (Fed. Cir. 1984) (separately patentable improvement may also be an equivalent under the doctrine of equivalents); *A.B. Dick Co. v. Burroughs Corp.*, 713 F.2d 700, 703, 218 USPQ 965, 967-68 (Fed. Cir. 1983) [**35] (infringement not avoided "merely by adding elements"), cert. denied, 464 U.S. 1042, 79 L. Ed. 2d 171, 104 S. Ct. 707 (1984). Each case must be decided on its particular facts, viewing the changes in the accused structure in

light of the claimed invention. See generally *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 934-35, 4 USPQ2d 1737, 1739 (Fed. Cir. 1987), cert. denied, 485 U.S. 961, 108 S. Ct. 1226, 99 L. Ed. 2d 426 (1988), and cert. denied, 485 U.S. 1009, 108 S. Ct. 1474, 99 L. Ed. 2d 703 (1988); *Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 805 F.2d 1558, 1569-70, 231 USPQ 833, 840 (Fed. Cir. 1986), reh'g denied, 846 F.2d 1369, 6 USPQ2d 1886 (Fed. Cir. 1988).

We conclude that the jury verdicts, viewed in light of the instructions, held that the Suzuki motorcycles with a rising rate infringed claim 9. We also conclude that on correct instructions no reasonable jury could have found that the claimed invention and the accused structures are not equivalent, on the established facts of record, applying the correct law of *Graver Tank*. See *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 252, 91 L. Ed. 2d 202, 106 S. Ct. 2505, [**36] (1986) ("The mere existence of a scintilla of evidence in support of the plaintiff's position will be insufficient; there must be evidence on which the jury could reasonably find for the plaintiff."); *Pullman-Standard v. Swint*, 456 U.S. 273, 291-92, 72 L. Ed. 2d 66, 102 S. Ct. 1781, (1982) ("where findings [by the district court] are infirm because of an erroneous view of the law, a remand is the proper course unless the record permits only one resolution of the factual issue"); *Dana Corp. v. IPC Limited Partnership*, 860 F.2d 415, 419, 8 USPQ2d 1692, 1696 (Fed. Cir. 1988) (when there are sufficient established facts of record, appellate court has discretion to determine the merits of JNOV motion.)

The jury verdicts of infringement are supported by substantial evidence, and are upheld. The judgment of infringement is affirmed.

III

Damages for Patent Infringement

As damages for patent infringement the jury assessed a royalty of fifty cents per motorcycle. Richardson states that this royalty is unreasonably low, and resulted from erroneous and prejudicial jury instructions. [**37] We review the award on the reasonable jury/substantial evidence standard. *Shatterproof Glass Corp.*, 758 F.2d at 627-28, 225 USPQ at 643-44.

The court told the jury: "Now, I will sustain, I will uphold your verdict [of infringement], but in determining damages and determining any royalty, it seems to me that you must consider that the infringement was a relatively minor infringement." [**1241] This instruction derived, as we have discussed, from the erroneous interpretation of the verdicts as limited to the "rising rate" clause. We must

determine whether this erroneous instruction was prejudicial to the jury's assessment of damages. The Ninth Circuit has stated that "we will reverse a judgment because of a mistake in jury instructions only if the error was prejudicial." *Smiddy v. Varney*, 665 F.2d 261, 265 (9th Cir. 1981), cert. denied, 459 U.S. 829, 74 L. Ed. 2d 66, 103 S. Ct. 65 (1982).

35 U.S.C. § 284 provides [**38] that damages shall be "adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer". *Fromson v. Western Litho Plate and Supply Co.*, 853 F.2d 1568, 1574, 7 USPQ2d 1606, 1612 (Fed. Cir. 1988). The jury was told that a royalty of \$ 2.00 per motorcycle with an annual minimum of \$ 70,000 had been agreed to by Suzuki and Richardson in the Option and License Agreement. There was testimony of much higher royalties paid by others for similar contributions to motorcycles. Suzuki presented testimony that the \$ 2.00 in the agreement does not apply, but should be the starting point for reducing the royalty because the infringement was minor.

We must assume that the jury followed the court's instruction that the infringement was minor. That instruction was a misinterpretation of the jury verdict of infringement, and it usurped the role of the jury. Absent this prejudicial instruction there was no reasonable basis on which reasonable jury could have found that fifty cents was a reasonable royalty.

The judgment of damages for patent infringement is vacated. We remand for retrial of the question. [**39]

IV

Richardson's Technical Information

Issues relating to Richardson's technical information were presented at trial on the legal theories of breach of contract and the tort of misappropriation of trade secrets. The district court concentrated the tort issues in presentation to the jury, apparently accepting Suzuki's position that it had complied with its contractual obligations to Richardson. The court thus required that Richardson prove the existence of legally protectible trade secrets and their misappropriation by Suzuki.

In the only special verdict on the contract issues, the jury found that Suzuki did not violate its duty of good faith and fair dealing in its relationship with Richardson. The jury instructions on the contractual relationship, however, are pertinent to, and intertwined with, the trade secret issues.

A. The Contractual Relationship

In matters of contract law and interpretation we apply the discernable law of the state of California. *Universal Gym Equipment, Inc. v. ERWA Exercise Equipment Ltd.*, 827 F.2d 1542, 1550, 4 USPQ2d 1035, 1040 (Fed. Cir. 1987). [**40] At trial Richardson pressed, unsuccessfully, the California law that a covenant of good faith and fair dealing is implied between parties to a contract. *Seaman's Direct Buying Service, Inc. v. Standard Oil Co.*, 36 Cal. 3d 752, 768, 686 P.2d 1158, 1166, 206 Cal. Rptr. 354, 363 (1984) ("It is well settled that, in California, the law implies in every contract a covenant of good faith and fair dealing." (Emphasis in original)).

The contract between Richardson and Suzuki was explained at trial, including the clause wherein Suzuki agreed not to use or disclose the "technical information, know-how, inventions, use data, and design specifications" that it received from Richardson. In discussing whether Suzuki was restrained in its post-contract use of Richardson's information, the district court at first instructed the jury that Suzuki was entitled by law "to use the most efficient means, even though they got it from plaintiff", stating that only "valid trade secrets" were subject to the contractual restraints:

And then after Suzuki's election not to take a license, of course, they were not supposed to use the plaintiff's trade secrets. That's what the contract [**41] says. And once again, you're going to have to determine whether these eleven were valid [**1242] trade secrets. To what extent did the defendant use them, to what extent would the defendant otherwise have developed them.

Now, some of these trade secrets refer to the best alignments and designs. Well, it seems incongruous to say to the defendant they cannot use the best because the best was intentionally disclosed by the plaintiff, and even though experimentation by the defendant surely would have revealed the best as the patent says that it would.

Were the defendants precluded from using the best or were they obliged to use something less efficient. I can't conceive of the defendants not being entitled to use the most efficient means, even though they got it from the plaintiff.

The court later qualified this position by referring to reverse engineering as being improper -- although it is far from clear what a reasonable jury would have understood from the court's instructions:

But on further reflection, I have to acknowledge that if you find there was a confidential relationship or contract that prohibited Suzuki from using the plaintiff's trade secrets, technical [**42] information or know-how, inventions or use data that the plaintiff gave them, unless it exercised the option, if you find those things to be true, I suppose it would be improper for Suzuki to reverse engineer from Richardson's prototypes, or from trade secrets or other information that he gave them.

The defense of reverse engineering does not apply to information received in confidence or whereas here the information is given under a contract.

Reviewing these instructions in the context of the contract and trade secret questions that were before the jury, we conclude that the jury was incorrectly instructed on the law. See *Bulgo v. Munoz*, 853 F.2d 710, 714 (9th Cir. 1988) (quoting *Los Angeles Memorial Coliseum Comm'n v. National Football League*, 726 F.2d 1381, 1398 (9th Cir.), cert. denied, 469 U.S. 990, 105 S. Ct. 397, 83 L. Ed. 2d 331 (1984)) (instructions reviewed to determine "whether, viewing the jury instructions as a whole, the trial judge gave adequate instructions on each element of the case to ensure that the jury [**43] fully understood the issues.")

In *Universal Gym Equipment*, 827 F.2d at 1549, 4 USPQ2d at 1040, we affirmed liability under California law based on breach of contract, when the parties contracted to limit the use by the recipient of "features, designs, technical information, or know-how" disclosed under the contract. We also affirmed that such a contractual arrangement is not incompatible with the patent law, *id.* at 1550, 4 USPQ2d at 1041, an issue on which the district court in Richardson's case also appears to have been misled, and to have misled the jury. See *Components for Research, Inc. v. Isolation Products, Inc.*, 241 Cal. App. 2d 726, 730, 50 Cal. Rptr. 829, 832 (1966) ("The judgment here but affords protection against the use of plaintiff's trade secrets by those to whom they had been disclosed in confidence. Whether the idea was patented or not, plaintiff is entitled to such protection").

The district court erred in law, in limiting the scope of protected information beyond that set forth in the contract, and in its instructions [**44] to the jury as to Suzuki's obligations. These errors are reflected in the trade secret issues.

B. The trade secret issues

The jury, despite the excessively restrictive instructions on what were trade secrets, found that certain items that Suzuki had received from Richardson were trade secrets and had been misappropriated, and assessed damages therefor. The jury also assessed damages for use by Suzuki of certain other items that did not "rise to the dignity of trade secrets", in the words of the special verdicts.

Richardson specified eleven items that he had disclosed to Suzuki under the contract, and that he asserted to be trade secrets; to wit: (1) the optimal characteristics of a motorcycle rear-wheel suspension shock absorber, showing three external adjustments, (2) engineering drawings of his proposed and furnished suspension systems, [**1243] (3) 1978 and 1979 Suzuki motorcycles modified by Richardson with his rising rate suspension, (4) specific force-velocity curves needed to obtain the advantages of Richardson's invention in Suzuki's motorcycles, (5) design modifications to extend rear wheel travel over earlier rising-rate designs, (6) design of the Alternate Shock [**45] Mount including drawings and knowhow, (7) the optimum use and types of certain bearings in the suspension, (8) motorcycle testing and tuning criteria, (9) his bell crank designs and design criteria, (10) adjustments in the angles and dimensions of the parts of the suspension and their effect on performance, and (11) the straight line tubular motorcycle frame.

The California law of trade secrets follows the Restatement definition:

A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. . . . Generally it relates to the production of goods, as, for example, a machine or formula for the production of an article.

By-Buk Co. v. Printed Cellophane Tape Co., 163 Cal. App. 2d 157 at 166, 329 P.2d 147 at 152, 118 USPQ 550 at 553 (1958), citing Restatement (First) of Torts, § 757 comment b (1939). The court in *By-Buk Co.* reaffirmed "plaintiff's right not to have its [trade secret] processes [**46] wrongfully disclosed to others and used to its detriment." *Id.* at 167, 329 P.2d at 153, 118 USPQ at 553.

The burden of proof was placed on Richardson to prove that his information met the legal requirements of a protectible trade secret. *Forro Precision, Inc. v.*

International Business Machines Corp., 673 F.2d 1045, 1056-57, 215 USPQ 299, 305-6 (9th Cir. 1982). This in turn required "either a covenant or a confidential relationship" as a premise of relief. Futurecraft Corp. v. Clary Corp., 205 Cal. App. 2d 279, 283, 23 Cal. Rptr. 198, 207-208 (1962) (discussing elements of trade secret protection). Richardson met this requirement through his contractual covenant.

The district court told the jury, several times, that because Suzuki might have developed or could have developed on its own the information it received from Richardson, such information can not be protected as a trade secret. The court said: "Now I think we must assume that the defendant could have accomplished whatever the plaintiff may have contributed toward the development [**47] of Models M and C." Whatever the validity of the proposed assumption as to Suzuki's abilities, the court's conclusion is contrary to California law:

It is not necessary in order that a process of manufacture be a trade secret that it be patentable or be something that could not be discovered by others by their own labor and ingenuity.

By-Buk Co., 163 Cal. App. 2d at 166, 329 P.2d at 152, 118 USPQ at 553. Nor does the possibility of independent discovery relieve Suzuki of liability:

"Secret formulas and processes * * * are property rights which will be protected by injunction, not only as against those who attempt to disclose or use them in violation of confidential relations or contracts express or implied, but as against those who are participating in such attempt with knowledge of such confidential relations or contract, though they might in time have reached the same result by their own independent experiments or efforts."

Id. at 167, 329 P.2d at 153, 118 USPQ at 553-54 [**48] (quoting Herold v. Herold China & Pottery Co., 257 F. 911, 913 (6th Cir. 1919)). Indeed, Suzuki did not argue that it had actually developed on its own the information that it first received from Richardson. Although Richardson adduced evidence that Suzuki had been unable to solve this problem, it is not relevant what Suzuki might have been able to do on its own. Ninth Circuit law upholds trade secret status even had the same information been obtainable from other sources. Clark v. Bunker, 453 F.2d 1006, 1010, 172 USPQ (BNA) 420, 423 (9th Cir. 1972) (trade secrecy

"is not negated because defendant by an expenditure of effort might have collected the [**1244] same information from sources available to the public.") (footnote omitted).

The court also erroneously instructed the jury that "slavish" copying is necessary for misappropriation, and that an exercise of independent judgment would remove the information from protection. The court instructed the jury to consider: "Were they secrets. And, second, did the defendants slavishly use them or did [**49] they make up their own minds." These views are contrary to California law. "Defendants cannot escape responsibility by showing that they have improved upon or modified the plaintiff's process." By-Buk Co., 163 Cal. App. 2d at 169, 329 P.2d at 154, 118 USPQ at 554. The court observed in Sinclair v. Aquarius Electronics, Inc., 42 Cal. App. 3d 216, 222, 116 Cal. Rptr. 654, 659, 184 USPQ 682, 684 (1974) that minor variations are to be expected.

Suzuki argued to the jury, and repeats on appeal, that information that Richardson developed after issuance of the '332 patent, including the Alternate Shock Mount, is barred from trade secret status because it was generally disclosed in Richardson's patent or known to the general public, or because it merely implements the patented invention.

The legal status of information and improvements made after a patent application has been filed is independent of the presence, or absence, of the patent application or ensuing patent. The information and improvements may be separately patentable; they may be preserved in [**50] confidence and disclosed only in accordance with agreement; and they are protected against misappropriation in accordance with the laws of contract and tort. The court misstated the law in telling the jury that the jury could decide whether Richardson could have both a valid patent and legal protection for later-developed information on the patented invention:

So on the one hand [Richardson] says the ordinary person skilled in the art can take this patent and use it and make a machine based upon it. But, on the other hand, he says, however, the experimentation and the ability to do this constitutes trade secrets for which you must pay me. Now, that constitutes a dilemma and it's up to you to determine the extent to which Mr. Richardson may claim as trade secrets things that the ordinarily prudent person skilled in the art should be able to do on his own.

The district court's phrase "should be able to do on his own" may explain its misperception of the law. It is not known what Suzuki was able to do on its own, for Suzuki not only sought Richardson's knowhow, improvements, data, and information, but also agreed to respect the confidentiality thereof. This information [**51] is intellectual property in the eyes of the law, and is protected in accordance with law. See generally *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 493, 40 L. Ed. 2d 315, 94 S. Ct. 1879 (1974). See also *Components for Research, Inc.*, 241 Cal. App. 2d at 730, 50 Cal. Rptr. at 832 (whether the product design was patented or not, plaintiff is entitled to trade secret protection for manufacturing process); *Sinclair*, 42 Cal. App. 3d at 225, 116 Cal. Rptr. at 660, 184 USPQ at 686 ("Trade secret law encourages invention in areas where patent law does not reach"). Accord *Thermotics, Inc. v. Bat-Jac Tool Co., Inc.*, 541 S.W.2d 255, 261, 193 USPQ 249, 253 (Tex. Civ. App. 1976) (post-patent improvement protectable under trade secret law); *Franke v. Wiltschek*, 209 F.2d 493, 495, 99 USPQ (BNA) 431, 433 (2d Cir. 1953) (immaterial that defendants could have derived trade secrets from expired patent).

It is apparent that the court imposed a higher standard for trade secret status than is contained in California law. The court's instructions, commentary, and phrasing of the special verdicts not only placed [**52] a prejudicially heavy burden on Richardson, but also demeaned the information itself.

Despite this prejudicial environment, the jury found that items 5 and 6 were trade secrets and had been misappropriated by Suzuki, and assessed damages therefore. The jury also found that items 1-4 and 7-11 were not trade secrets, and that for some but not all of these items compensation [**1245] should be awarded based on "benefit from the plaintiff's knowledge and from the time and effort expended by him".

The district court granted Suzuki's motion for a new trial with respect to items 5 and 6, and upheld the jury verdicts with respect to items 1-4 and 7-11.

C. The new trial of items 5 and 6

The grant of a new trial is ordinarily not reviewable, but on this issue the district court entered final judgment for purposes of appeal, and certified three questions. The first certified question is:

1. Were the plaintiff's asserted trade secrets Nos. 5 and 6: (a) Actually valid proprietary trade secrets, as the jury found and awarded very substantial royalties; or (b) Did the plaintiff's contributions in these respects represent no more than the services of a skilled mechanic, which [**53] readily could have been duplicated by the defendant, and which entitled the

plaintiff only to quantum meruit compensation, as the court believes; or (c) Were the plaintiff's contributions no more than those contemplated under the option agreement and paid for by the defendant, as the defendant contends?

We respond to this question: From the record before us the jury verdict that items 5 and 6 met the requirements for trade secret protection was supported by the great weight of the evidence. Richardson and Cazort testified about the design modifications that were the subject of item No. 5 and the Alternate Shock Mount subject of item No. 6. The Alternate Shock Mount was considered sufficiently novel and valuable that Suzuki included it in a patent application filed in Japan and later in the United States. The record does not negate the jury's determination of the value of this information. According to California law it is immaterial what Suzuki could have done, for it chose to use Richardson's information, which it obtained under restraint.

In further response, we remark that the relation between the parties, set by contract, was a routine commercial arrangement wherein [**54] Richardson agreed to facilitate Suzuki's testing and evaluation of Richardson's invention. This did not convert Richardson's work in adapting his invention to Suzuki's motorcycle into the work of a hired technician whose work product was automatically owned by Suzuki. The proprietary nature of the work done and information provided by Richardson was established by agreement, as was the agreement that Suzuki would not use this information if it did not exercise its option.

There was substantial evidence before the jury that the information on items 5 and 6 was not publicly known, that Suzuki agreed to receive and preserve it in confidence, and that the information fully satisfies the statutory and jurisprudential requirements for protectible trade secrets.

In order to vacate the jury's verdict upholding items 5 and 6 as trade secrets and grant a new trial thereon, the trial court must find that the jury's verdict "is contrary to the clear weight of the evidence, or is based upon evidence which is false, or to prevent, in the sound discretion of the trial judge, a miscarriage of justice. [**55] " *Hanson v. Shell Oil Co.*, 541 F.2d 1352, 1359 (9th Cir. 1976), cert. denied, 429 U.S. 1074, 50 L. Ed. 2d 792, 97 S. Ct. 813 (1977) (quoting *Moist Cold Refrigerator Co. v. Lou Johnson Co.*, 249 F.2d 246, 256, 115 USPQ 160, 168-69 (9th Cir. 1957), cert. denied, 356 U.S. 968, 2 L. Ed. 2d 1074, 78 S. Ct. 1008 (1958)); *William Inglis & Sons Baking Co. v. I.T.T. Continental Baking Co., Inc.*, 668 F.2d 1014, 1027 (9th Cir. 1981), cert. denied, 459 U.S. 825, 74 L. Ed. 2d 61, 103 S. Ct. 57, 103 S. Ct. 58 (1982). It is insufficient

that the district court would simply have reached a different verdict.

Our review requires determination of whether the district court abused its discretion in its decision to grant the new trial. *Id.* See Transgo, Inc. v. Ajac Transmission Parts Corp., 768 F.2d 1001, 1014, 227 USPQ 598, 602 (9th Cir. 1985), *cert. denied*, 474 U.S. 1059, 88 L. Ed. 2d 778, 106 S. Ct. 802 (1986) ("the grant or denial of either a motion for a new trial [**56] or a motion to amend the judgment must be reviewed on the basis of a determination of whether the district court abused its discretion.") [*1246] See generally Seattle Box Co. v. Industrial Crating & Packing, Inc., 756 F.2d 1574, 1581, 225 USPQ 357, 363 (Fed. Cir. 1985) ("Abuse of discretion may be established by showing that the district court either made an error of law, or a clear error of judgment, or made findings which were clearly erroneous.") The district court's statements, for example with respect to item 5, "I simply cannot conclude that that is a trade secret. It was an attempt to help Suzuki adapt the Richardson concept to the Suzuki machine . . .", reflect an error of law.

Despite the legal error in the instructions, as we have discussed, any prejudice resulting therefrom favored Suzuki, not Richardson. We conclude that the district court exceeded its discretionary authority in vacating the jury verdict and ordering a new trial. That action is reversed, and the jury verdict is reinstated as to items Nos. 5 and 6, including the damages assessed for items Nos. 5 and 6.

D. Items 1-4 and 7-11

For asserted trade secrets Nos. 1-4 and 7-11, the [**57] jury may well have been led by erroneous instructions into applying an incorrect legal standard, in finding that these items were not trade secrets. It appears, however, that Richardson did not move for judgment n.o.v. or a new trial on these verdicts. Although there is a hint in the post-trial colloquy that the court intended or was willing to retry all the trade secret issues along with items 5 and 6, this does not satisfy the rule, supported by logic, that the formalities of post-trial motions be respected. Snellman v. Ricoh Co., 836 F.2d 528, 534, 5 USPQ2d 1341, 1346 (Fed. Cir. 1987) (applying Ninth Circuit law in holding that motions for judgment n.o.v. and for a new trial must be made). Thus we have no authority to review these verdicts.

By special verdict the jury was also asked to assess damages for Suzuki's use of the information encompassed in each of items 1-4 and 7-11, even if the information did not "rise to the dignity of trade secrets". The jury determined this sum for each item,

some at \$ 0, the highest at \$ 25,000, for a total of \$ 104,000. The district [**58] court sustained this award, on a theory of "quantum meru it compensation". Both parties appeal this award, Richardson asserting its inadequacy, and Suzuki arguing that Richardson was fully paid for his information in the option agreement, and is not entitled to damages for Suzuki's use of any information received from Richardson.

We have rejected, as a matter of law, Suzuki's theory that it is entitled to use, free, the information disclosed by Richardson under the option agreement. Richardson's disclosures were made under terms that prohibited their use by Suzuki if the option was not exercised. This contract provision does not depend on whether the information is a trade secret, but only on whether it was previously known to Suzuki or generally known to the public, as discussed *ante*.

An appellate tribunal is abjured to determine whether a jury verdict can be sustained, on any reasonable theory. Jaffke v. Dunham, 352 U.S. 280, 281, 1 L. Ed. 2d 314, 77 S. Ct. 307 (1957) ("A successful party in the District Court may sustain its judgment on any ground that finds [**59] support in the record.")

There was substantial evidence at trial whereby a reasonable jury could have determined the sums awarded by this jury. Indeed, Suzuki does not challenge the valuations of the damage awards for items 1-11, arguing instead that nothing at all is owing.

The judgment as to items 1-4 and 7-11 is affirmed, including damages assessed for these items in the total amount of \$ 104,000.

V

Injunction

The district court, having entered final judgment that the Suzuki Full Floater suspension infringed claim 9 of the '332 patent, denied Richardson's motion for injunction.

Infringement having been established, it is contrary to the laws of property, of [*1247] which the patent law partakes, to deny the patentee's right to exclude others from use of his property. 35 U.S.C. § 261. "The right to exclude recognized in a patent is but the essence of the concept of property". Connell, 722 F.2d at 1548, 220 USPQ at 198 (citing Schenck v. Norton Corp., 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983)).

[**60] It is the general rule that an injunction will issue when infringement has been adjudged, absent a sound reason for denying it. W.L. Gore & Associates, Inc. v. Garlock, Inc., 842 F.2d 1275, 1281, 6 USPQ2d 1277, 1283 (Fed. Cir. 1988). Suzuki has presented no

such reason. This court stated in H.H. Robertson Co. v. United Steel Deck, Inc., 820 F.2d 384, 390, 2 USPQ2d 1926, 1929-30 (Fed. Cir. 1987), when reviewing an injunction granted *pendente lite*:

In matters involving patent rights, irreparable harm has been presumed when a clear showing has been made of patent validity and infringement. Smith International, 718 F.2d at 1581, 219 USPQ at 692. This presumption derives in part from the finite term of the patent grant, for patent expiration is not suspended during litigation, and the passage of time can work irremediable harm.

We observe that the '332 patent will expire in less than four years, that litigation started over eight years ago, and that the district court [**61] remarked that further proceedings could consume "several years".

Further, a misappropriator of trade secrets has no authorization of right to continue to reap the benefits of its wrongful acts. Richardson is entitled to an injunction against Suzuki's continuing use of trade secrets Nos. 5 and 6. By-Buk Co., 163 Cal. App. 2d at 167, 329 P.2d at 153, 118 USPQ at 553-54; Components for Research, Inc., 241 Cal. App. 2d at 730, 50 Cal. Rptr. at 832.

The denial of Richardson's request for injunction is reversed. On remand the district court shall enter appropriate injunctive relief.

VI

Fraud

The jury found by special verdicts that Suzuki fraudulently induced Richardson to reveal his trade secrets by concealing its intention not to exercise its option or take a license, and that Suzuki fraudulently concealed from Richardson the fact that it was developing the Full Floater "with the intention of declining to exercise the option and then nevertheless to utilize the plaintiff's trade secrets in the full floater". The jury also found fraud in that Suzuki filed the Tamaki patent application "in the knowledge that the invention asserted therein [**62] (the spring/swing arm connection) was first disclosed to them by Richardson". The jury awarded Richardson \$ 20,000 in compensatory and \$ 100,000 in punitive damages.

The district court vacated the judgment and ordered a new trial. Suzuki asserts that the court should have granted Suzuki's motion for judgment n.o.v. instead of ordering a new trial, while Richardson asserts that the court should have upheld the jury verdicts.

The district court certified the question of how to treat its belief that Suzuki did not commit the offenses of fraud and concealment found by the jury, including the question of punitive damages. We first must consider whether a reasonable jury could have reached the verdicts here reached. Lavender v. Kurn, 327 U.S. at 653. Apt is the statement of the Ninth Circuit in Crocker-Citizens Nat'l Bank v. Control Metals Corp., 566 F.2d 631, 635 (9th Cir. 1977): "Courts are not free to reweigh the evidence and set aside the jury verdict merely because the jury could have drawn different inferences or conclusions or because judges feel [**63] that other results are more reasonable", quoting Cockrum v. Whitney, 479 F.2d 84, 86 (9th Cir. 1973), in turn quoting Tennant v. Peoria & P. U. Ry. Co., 321 U.S. 29, 35, 88 L. Ed. 520, 64 S. Ct. 409 (1944).

The record shows that there was testimony, based on certain of Suzuki's documents, on which a reasonable jury [**1248] could have supported these verdicts. There were issues of credibility, and inferences that could reasonably have been drawn in a manner adverse to Suzuki. "The credibility of witnesses and the weight of the evidence are issues for the jury and are generally not subject to appellate review." Benigni, 853 F.2d at 1525. While the district court may have believed that Suzuki did not commit fraud, review shows that the requirements for vacating the jury verdicts and relitigating the issue were not met. Hanson, 541 F.2d at 1359; William Inglis, 668 F.2d at 1027. A fresh trial is not warranted simply because the district court would have reached a different verdict.

[**64] A jury assessment of punitive damages is not excluded in circumstances such as those here presented, where the jury expressly found fraud. Tri-Tron Int'l v. Velto, 525 F.2d 432, 437, 188 USPQ 177, 181 (9th Cir. 1975) ("where compensatory damages are sought and awarded, the court has power, on a proper record, to award punitive damages"), citing Clark v. Bunker, 453 F.2d 1006, 1012, 172 USPQ (BNA) 420, 424 (9th Cir. 1972), in turn citing El Ranco, Inc. v. First Nat'l Bank, 406 F.2d 1205, 1218 (9th Cir. 1968), cert. denied, 396 U.S. 875, 90 S. Ct. 150, 24 L. Ed. 2d 133 (1969) (jury verdict awarding punitive damages was supported by evidence of malice) and Davenport v. Mutual Benefit Health & Accident Ass'n, 325 F.2d 785, 787 (9th Cir. 1963) (remand for trial to allow evidence of fraud to support claim of punitive damages.)

The district court correctly instructed the jury as to the law, stating that "it's only if you find that the defendants' conduct stem from malice, oppression, fraud or bad faith that you can find any punitive damage at all. [**65] " As stated in In re Innovative

Construction Systems, Inc., 793 F.2d 875, 889, 230 USPQ 94, 104 (7th Cir. 1986):

[A] breach of faith underlies every trade secret claim. However, establishing that breach alone is insufficient to warrant an award of punitive damages; one must also demonstrate that the defendant acted wantonly, willfully, or in reckless disregard of the plaintiff's rights. (Citations omitted)

See also Neal v. Farmers Insurance Exchange, 21 Cal. 3d 910, 928, 582 P.2d 980, 986, 148 Cal. Rptr. 389, 395 (1978) ("In order to justify an award of exemplary damages, the defendant must be guilty of oppression, fraud or malice. (Civ. Code § 3294.) He must act with the intent to vex, injure or annoy, or with a conscious disregard of the plaintiff's rights") (quoting Silberg v. California Life Insurance Co., 11 Cal. 3d 452, 462, 521 P.2d 1103, 1110, 113 Cal. Rptr. 711, 718 (1974)); Reynolds Metals Co. v. Lampert, 316 F.2d 272, 275 (9th Cir. 1963), cert. denied, 376 U.S. 910, 11 L. Ed. 2d 608, 84 S. Ct. 664 (1964) [**66] (in jury trial, evidence to justify punitive damages must show injury was done maliciously or willfully and wantonly or committed with bad motive or recklessly); Transgo, Inc., 768 F.2d at 1024 (The determination to award punitive damages was "within the exclusive province of the jury") (quoting Runge v. Lee, 441 F.2d 579, 584, 169 USPQ 388, 392 (9th Cir.), cert. denied, 404 U.S. 887, 30 L. Ed. 2d 169, 92 S. Ct. 197 (1971)).

The jury having found by special verdicts that Suzuki acted fraudulently, the requisite intent was established. "We give the trial judge and jury wide discretion in assessing punitive damages." Hatrock v. Edward D. Jones & Co., 750 F.2d 767, 772 (9th Cir. 1984). The jury's award was not "so disproportionate to the damages sustained as to be the result of passion or prejudice". *Id.* (citing Neal, 21 Cal. 3d at 928, 582 P.2d at 990, 148 Cal. Rptr. at 399). Transgo, Inc., 768 F.2d at 1024 [**67] ("We will not overturn such an award unless it appears that the jury was influenced by passion or prejudice.") (citing Harmsen v. Smith, 693 F.2d 932, 947 (9th Cir. 1982), cert. denied, 464 U.S. 822, 78 L. Ed. 2d 97, 104 S. Ct. 89 (1983)).

We answer the certified question that, in this case, neither a new trial nor judgment n.o.v. was warranted. The order of a new trial on this issue is vacated. The judgment on the jury verdicts of fraud and the award of compensatory and punitive damages is reinstated.

[*1249] VII

The Tamaki Patent

Richardson states that Suzuki fraudulently patented the Alternate Shock Mount that had been disclosed to Suzuki by Richardson and Cazort, in a patent that also described the "criss-cross" modification developed at Suzuki. There was evidence and argument on the factual premises, including the absence of supporting documentation on the part of the named inventors Hirohide Tamaki and Manabu Suzuki, the earliest record on their behalf being dated October 1979. The corresponding Japanese patent application was filed on October 16, 1979.

The jury rendered the following special verdicts:

C-3. Did Suzuki [**68] and/or Mr. Tamaki file the Tamaki patent application in the knowledge that the invention asserted therein (the spring/swing arm connection) was first disclosed to them by Richardson:

Answer: YES

H-1. Do you find that the Plaintiff, Richardson, is the real inventor of the invention shown in the Tamaki patents and patent applications?

Answer: NO

It was not significantly disputed at trial that claims 1 through 8 of the Tamaki corresponding United States Patent No. 4,457,393 cover the Alternate Shock Mount of Richardson and Cazort, and that claim 9 includes the criss-cross embodiment of Tamaki and Suzuki. (The scope of claim 5 is raised, but is not material to our conclusion.)

The district court denied Richardson's post-trial motion that the Tamaki patent be assigned to Richardson. In colloquy with counsel the court explained that it could not do so because "the jury said Richardson wasn't the inventor". Indeed it was conceded, and discussed at trial, that Richardson and Cazort, not Richardson alone, invented the Alternate Shock Mount. Cazort, as well as Richardson, testified at length on this structure. Special verdict H-1 that Richardson is not "the real inventor" [**69] is in accord with the co-inventor status of Cazort, and also with the Japanese contribution of the criss-cross embodiment.

The force of special verdict C-3 is not diminished. This verdict was not challenged on appeal. "It was further the duty of the court to direct the appropriate judgment to be entered upon the special verdict." Traders and General Insurance Co. v. Mallitz, 315 F.2d 171, 175 (5th Cir. 1963). The district court having failed to implement this verdict, Richardson's motion for judgment and for assignment of the Tamaki patents was not out of order.

The remedy of assignment of the Tamaki patents is a different question from whether Richardson is a sole or

joint inventor. The correction of inventorship is an administrative step, and is not before the court. Similarly, the presence of a further modification in one or two claims of the patent directed to the Alternate Shock Mount does not negate the imposition of an equitable remedy. To hold otherwise would ratify and indeed reward the wrongdoing.

Based on the jury verdict, Richardson is entitled to ownership [**70] of the patents as against Suzuki. Such remedy is appropriate under the circumstances; see, e.g., Colgate-Palmolive Co. v. Carter Products, Inc., 230 F.2d 855, 865, 108 USPQ 383, 391 (4th Cir.), cert. denied, 352 U.S. 843, 1 L. Ed. 2d 59, 77 S. Ct. 43 (1956) (corporate assignee of patent application ordered to assign to original holder of trade secrets all rights to patent applications based thereon); De Long Corp. v. Lucas, 176 F. Supp. 104, 134 (S.D.N.Y. 1959), aff'd, 278 F.2d 804 (2nd Cir.), cert. denied, 364 U.S. 833, 5 L. Ed. 2d 58, 81 S. Ct. 71 (1960) (when an employee has acquired patents on inventions developed by his former employer, "the courts will hold the wrongdoer to be a constructive trustee of the property misappropriated and will order a conveyance by the wrongdoer to the former employer"); Becher v. Contoure Laboratories, Inc., 279 U.S. 388, 73 L. Ed. 752, 49 S. Ct. 356 (1929) (same); Saco-Lowell Shops v. Reynolds, 141 F.2d 587, 598, 61 USPQ 3, 13 (4th Cir. 1944) (requiring assignment of patent [**1250] based on ideas received by licensee [**71] from licensor in confidence during development of invention for market).

Suzuki argues that Richardson has no remedy other than by seeking an interference in the United States Patent and Trademark Office with his own invention, and presumably by taking similar actions, if such are available, in other countries. We do not agree. The courts are not powerless to redress wrongful appropriation of intellectual property by those subject to the courts' jurisdiction.

The denial of Richardson's motion for judgment is reversed. Suzuki shall assign to Richardson the patents filed by Suzuki that include the Richardson/Cazort invention of the Alternate Shock Mount, in all countries. We remand to the district court for the purpose of implementing compliance.

VIII

Prejudgment Interest

The district court denied Richardson's request for prejudgment interest on both the patent infringement and the trade secret damage awards. Prejudgment interest is the rule governing this class of award. General Motors Corp. v. Devex Corp., 461 U.S. 648, 655, 217 USPQ 1185, 1188, 76 L. Ed. 2d 211, 103 S.

Ct. 2058 (1983); [**72] Lummus Industries, Inc. v. D.M. & E. Corp., 862 F.2d 267, 274, 8 USPQ2d 1983, 1988 (Fed. Cir. 1988); Fromson, 853 F.2d at 1573-74, 7 USPQ2d at 1611; Bio-Rad Laboratories, Inc. v. Nicolet Instrument Corp., 807 F.2d 964, 967, 1 USPQ2d 1191, 1193 (Fed. Cir. 1986), cert. denied, 482 U.S. 915, 107 S. Ct. 3187, 96 L. Ed. 2d 675 (1987).

No exceptional circumstances having been shown, and no reason why damages for misappropriated trade secrets should be treated differently from damages for patent infringement, the denial of prejudgment interest is reversed.

IX

Willful Infringement and Exceptional Case

The district court refused to submit the question of willful infringement to the jury, stating that Richardson had not provided sufficient evidence to go to the jury.

To refuse to give an issue to the jury is to direct a verdict in favor of the opposing party. Thus we review the district court's ruling on the standard of "whether the evidence permits only one reasonable conclusion after viewing the evidence in the [**73] light most favorable to the non-moving party and drawing all inferences in favor of that party." Bulgo v. Munoz, 853 F.2d 710, 714 (9th Cir. 1988) (citing Peterson v. Kennedy, 771 F.2d 1244, 1256 (9th Cir. 1985), cert. denied, 475 U.S. 1122, 90 L. Ed. 2d 187, 106 S. Ct. 1642 (1986)). See also Connell, 722 F.2d at 1546, 220 USPQ at 197.

Richardson refers to the evidence adduced in connection with the jury verdicts of fraud, to the verdicts of misappropriation of trade secrets 5 and 6, to the absence of any opinion of United States counsel concerning validity of the '332 patent when Suzuki started its infringing activity, and to evidence from Suzuki's records tending to show bad faith. Viewing this evidence in the light most favorable to Richardson, and drawing all reasonable inferences in his favor, there was sufficient evidence to take to the jury, for the evidence does not require a verdict in favor of Suzuki. Absent sufficient basis for directing the verdict, Richardson has the right of jury determination of this factual question. Willfulness of behavior is a classical jury question of intent. Shiley, 794 F.2d at 1568, 230 USPQ at 115; [**74] Hammerquist v. Clarke's Sheet Metal, Inc., 658 F.2d 1319, 1325-26, 212 USPQ (BNA) 481, 486 (9th Cir. 1981), cert. denied, 460 U.S. 1052, 103 S. Ct. 1499, 75 L. Ed. 2d 930 (1983). When trial is had to a jury, the issue should be decided by the jury.

We remand for this purpose. The jury's findings on the issue of willfulness will be pertinent not only to the question of multiplication of damages under 35 U.S.C. § 284, but also to determination of whether this is an exceptional case in terms of 35 U.S.C. § 285. Entitlement under California Civil Code § 3426 et seq. may also be considered.

X

Other Arguments

Both sides have raised many points in their briefs, disputing most aspects of the proceedings. We have considered all arguments in reaching our conclusions.

Costs

The award by the trial court of only one third costs to Richardson, in view of the judgments in his favor on the major substantive issues, exceeded the trial court's discretionary authority. Richardson is entitled **[**75]** to his statutory costs incurred before the district court. The reduction thereof is reversed.

Costs on this appeal are taxed in favor of Richardson.

AFFIRMED IN PART, REVERSED IN PART,
VACATED IN PART, AND REMANDED

IN THE MATTER OF THE APPLICATION OF STEPHEN F. ROYKA AND ROBERT G. MARTIN

Patent Appeal No. 9092

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

490 F.2d 981; 1974 CCPA LEXIS 200; 180 U.S.P.Q. (BNA) 580

February 7, 1974, Decided.

PRIOR HISTORY: [**1] Serial No. 648,701.**CASE SUMMARY**

PROCEDURAL POSTURE: Appellants sought review of a decision of the U.S. Patent Office Board of Appeals that affirmed the rejection of appellants' patent claims for a printed matter self-testing system as obvious under 35 U.S.C.S. § 103 and anticipated under 35 U.S.C.S. § 102.

OVERVIEW: Appellants designed an answer sheet for use in self-testing that featured a response area having legible, confusing information in erasable printing imposed over answers in permanent printing. The claims were rejected as anticipated by prior art under 35 U.S.C.S. § 102 and as obvious under 35 U.S.C.S. § 103. The court reversed, finding that the superimposed printing in appellant's response was legible and imparted information, which was not the case in the prior references. Therefore, the court held that a finding of anticipation was not warranted, as the claimed invention was not disclosed in the prior art. The court also noted that printed matter could constitute structural limitations upon which patentability could be predicated. The court found that the claims were not obvious for the same reasons they were not anticipated by prior art.

OUTCOME: The court reversed the Board's decision that rejected appellants' claims as obvious and anticipated. The court held that appellants' invention was sufficiently distinguished from prior art that it was neither anticipated by it nor obvious in light of it.

OPINIONBY: RICH**OPINION:** [*981]

RICH, Judge.

This appeal is from the decision of the Patent Office Board of Appeals affirming the examiner's rejection of claims 28 and 30-36 of application serial No. 648,701, filed June 26, 1967, entitled "Responsive Answer System." We reverse.

The Invention

The appealed claims are directed to a device in the nature of an answer sheet for use in self-instruction and testing. The answer sheet may be associated with

questions or separate therefrom. the essential features of the invention are that there are printed on the answer sheet in "response areas" meaningful information in permanent printing and confusing information in printing which can be removed, as by an eraser, both being legible so that a student, seeing a choice of answers to a question, must make a selection. Having made a selection, he then applies as eraser to the selected response area and some of the information will be readily removed. What remains advises him of the correctness or otherwise of his answer. The following figures from the drawings are illustrative:

[Graphic omitted. See illustration in original.]

Fig. 1A shows two response areas [**2] to a given question before any removing action [*982] by the student has taken place and Fig. 1B shows the permanent information remaining in each after erasure of the removable information. Of course, if the student makes an initial choice of area A, showing up "YES" or some other indication of a correct answer, he will not need to proceed further and erase the B area. In a modified form of the invention, a wrong selection, plus erasure, may expose, instead of or in addition to a statement that the answer is wrong, a number or other reference to further material which is to be studied.

A preferred method of printing the permanent meaningful information and the removable confusing information is by that type of xerography in which a fusible toner is used, the permanence of the printing depending on the extent to which the toner image is "fixed" or fused by heat. By successive printings of the two kinds of information with fixing to different degrees, one image can be made permanent and the other made subject to easy removal, both images retaining such similarity of appearance that the user of the answer sheet cannot tell them apart.

Claim 28 is the principal claim, all [**3] others being dependent thereon, and reads as follows:

28. A device for selectively indicating information comprising

a support having response areas for presenting information for selection,

permanent printing indicative of meaningful information permanently fixed to said support within a response area, and

removable printing indicative of confusing information removably fixed to said support within a response area,

said meaningful and confusing information being substantially legible even when said permanent and removable printing are fixed over one another on said support,

said permanent and removable printing being substantially similar such that an observer cannot determine which information is permanent and which is removable

whereby the information within a response area is selected by attempting to remove the printing therein with the failure to remove printing identifying meaningful information.

Claims 30-36 add limitations which need not be considered except for noting that claims 33 and 34 alone specify the use of a xerographic toner, for which reason they were rejected on a different ground from the other claims.

The Rejection

The following references [**4] were relied on:

[SEE TABLE IN ORIGINAL]

Claims 28, 30, 31, and 32 were rejected as anticipated under 35 USC 102 by Bernstein; claims 28, 31, 32, 35, and 36 were rejected as anticipated under § 102 by Reid; and claims 33 and 34 were rejected under 35 USC 103 for obviousness, on either Bernstein or Reid in view of Lein. These were the examiner's rejections and the board affirmed them, adhering to its decision on reconsideration.

Bernstein discloses an answer sheet in which printed information representing a response is "temporarily concealed from the observer" and he discloses a number of different ways of effectively concealing the response. His specification states:

The objects of the invention are accomplished by utilizing the hiding media to confuse the participant and to render the response and the hiding media indistinguishable and thus conceal the presence, absence, nature or position of the response from the participant. This may be effectuated by careful attention being paid to a number of factors including the design, [**983] color and position of the hiding or confusing media.

Fig. 1 of Bernstein's drawings illustrates some of his concealing means: [**5]

[Graphic omitted. See illustration in original.]

The following is the written description:

Referring now to the drawing, FIG. 1 illustrates some of the many optically confusing patterns which may be positioned between the printed structure to be concealed and the point of observation. Column 11 shows the information which is to be concealed. This information is repeated in columns 12 through 16 but in each case is concealed by a pattern in accordance with the present invention. Column 12 utilizes a pattern comprising an alphabetical maze in both line and half tone screen. Column 13 utilizes a pattern comprising an absorbing field having a plurality of irregular dot-like interstices. Column 14 utilizes a pattern comprising a maze of plus signs combined with dots. Columns 15 and 15 illustrate irregular and non-repetitious patterns. Bernstein says that if at least 50% of the response is actually covered by the opaque portions of the confusion pattern, complete concealment is obtained. He also says that added means of concealment may be used, such as scoring and embossing and perforating the paper in order to scatter the light or let it shine through.

Reid is entitled [**6] "Transformation Picture and Print." The invention is said to be useful for advertisements, Christmas cards, birthday cards, valentines, and the like and as a source of amusement and instruction for children. It consists of a picture or print, part of which is permanently printed and part of which is removable from the paper on which it is printed. For the latter various soluble undercoatings or inks are described. If the picture is washed with a solvent, which may be water, the removable part disappears and the pictorial and/or typographic matter changes. The invention is illustrated by a typical nineteenth century temperance propaganda piece depicting the evils of drink. In the finished picture there are three scenes from left to right: Scene 1, the innocent child leads her father home from the pub; Scene 2, Father sits slumped in the kitchen chair with his bottle beside him, the family wash hanging above his head, this picture being entitled "The Effects of Drink"; Scene 3, Mother stands in front of a sign reading "Pawn Shop." Across the bottom of the picture is a legend which says "Wash the above and see what water will do." Fig. II shows the result of washing with water: Scene [**7] 1, a handsome young man and his happy daughter stroll on the street; Scene 2, Father sits erect in a well-appointed room at a cloth-covered table, apparently having a cup of tea, obviously a gentleman; Scene 3, Mother beams from the sideline and the Pawn Shop sign has vanished. Two new subscriptions appear and the words "The" and "Drink" have disappeared, the resultant being a new picture title

reading "The Beneficial Effects of Temperance." "The Beneficial" and "Temperance" were covered by some soluble opaque in the original picture. No doubt the overall effect is instruction. Perhaps there was amusement in bringing about the transformation.

Lein relates to xerography and is relied on only for its disclosure of the removability of partially fused toner and the permanence of fully fused toner.

OPINION

As to the § 102 anticipation rejections, it will suffice to consider independent claim 28. If it is not fully met by Reid [*984] or Bernstein, neither are the more limited dependent claims. It is elementary that to support an anticipation rejection, all elements of the claim must be found in the reference. We do not find claim 28 anticipated by Bernstein because, as [*8] we read the claim, it requires the display of legible meaningful and legible confusing information simultaneously, between which the user of the device may make a selection before he undertakes to remove any of the information from the response area selected by him. The element we find most clearly missing, contrary to the reasoning of the examiner and the board, is the legible confusing information. The Patent Office proposes to read this limitation on Bernstein's confusion patterns which are nothing but meaningless obscuring screens, conveying no information and providing the user with no basis for making a selection, as called for by claim 28. In appellants' device the legible confusing information - i.e., the wrong answers - are legible in the sense that they can be read as intelligible words, not merely a jumble of type serving to obscure the words of the wrong answers.

Appellants were fully aware of Bernstein and discussed its disclosures in their specification, distinguishing from this and other prior art, saying, in part:

The inventive concept hereof confuses not by physical blocking as taught by the prior art, but by compounding, associating (including disarranging) [*9] permanent information with confusing information, usually at least some of which is similar in character to the permanent information as to render it impossible to tell which is permanent and which is removable confusing information. In the invention, generally no attempt is made to designedly physically cover the permanent information, but to confuse it beyond interpretation by the presentation of extraneous removable, confusing information.

Claims are not to be read in a vacuum and while it is true they are to be given the broadest reasonable interpretation during prosecution, their terms still have to be given the meaning called for by the specification

of which they form a part. We cannot read the terms "legible" and "information" on Bernstein's confusion patterns, as did the examiner and the board. They are not "legible," as appellants use the term, and they convey no information.

As to anticipation by Reid, we find neither appellants' basic concept nor the substance of claim 28 to be disclosed. Apparently the solicitor could find little to support the rejection in Reid for all he says in his brief - so far as claim 28 is concerned - is:

Reid discloses a sheet which may [*10] be used for instruction and which may have a removable design partly covering a fixed design * * *. Therefore, the disclosure of the reference encompasses the arrangement wherein a removable design covers a fixed design with both designs being substantially legible.

But claim 28 does not call for an arrangement wherein a removable design covers a fixed design. It calls for response areas, which Reid does not have, containing meaningful information in permanent printing together with removable printing conveying confusing information, both legible at the same time, between which a "selection" can be made. The only choice offered to the user by Reid is to follow the instruction to wash the whole visible picture with water or other solvent, thus removing the over-printing, to discover what the permanent picture is. The Patent Office attempt to read claim 28 on this reference is a tour de force. We hold that Reid does not anticipate for failure to meet the limitations of claim 28 to "response areas," to the presentation of two categories of information (meaningful-permanent and removable-confusing) within such areas, and the possibility of selection. Anticipation requires a finding [*11] that the claimed invention be disclosed. It is not enough to say that appellants' invention and the reference are [*985] both usable for instruction and both consist of permanent and removable printings on paper, as did the solicitor.

The dependent claims rejected with claim 28, as anticipated under § 102, are not anticipated since claim 28 is not anticipated. Some of them merely add features which are disclosed by the references and some do not. Insofar as they do not, they further negative anticipation. The examiner recognized this fact as to claims 33 and 34, which are limited to xerography, and therefore did not reject them under § 102. Similarly, he did not reject claim 30 on Reid or claims 35 and 36 on Bernstein. We find that claims 35 and 36 contain limitations which additionally distinguish from Reid. We have already noted that Reid has no "response areas" as required by claim 28 and so Reid does not disclose the structure of claim 35

which additionally requires both the correct and incorrect answers to appear within the same response area.

As to claim 36, the examiner said it "is merely a printed matter variation of the design of the reference," Reid. This [**12] is not a valid reason for rejection. Printed matter may very well constitute structural limitations upon which patentability can be predicated. We have commented on this matter in In re Jones, 54 CCPA 1218, 373 F.2d 1007, 153 USPQ 77 (1967); and In re Miller, 57 CCPA 809, 418 F.2d 1392, 164 USPQ 46 (1969), and will not repeat ourselves. The limitations of claim 36 are not remotely suggested by Reid.

There remains the § 103 rejection of claims 33 and 34. Do they, taken together with all of the limitations of claim 28 from which they depend, define obvious subject matter? The difference between claim 28 and these two dependent claims is that they add the limitations to xerography. If Bernstein and Reid showed the claimed invention except for xerography, the addition of the Lein reference would make the subject matter of the claims obvious. But that is not the situation here. Adding the knowledge of xerographic technology to Bernstein or Reid still does not make the invention of claims 33 and 34 obvious for the same reasons we have given above in discussing anticipation. The essence of appellants' invention, as set forth in claim 28, is still missing notwithstanding the addition [**13] of the Lein reference and we see nothing in the combinations of references which would have made the invention obvious to one of ordinary skill in the art at the time it was made. We will, therefore, reverse this rejection.

The decision of the board is reversed.

REVERSED

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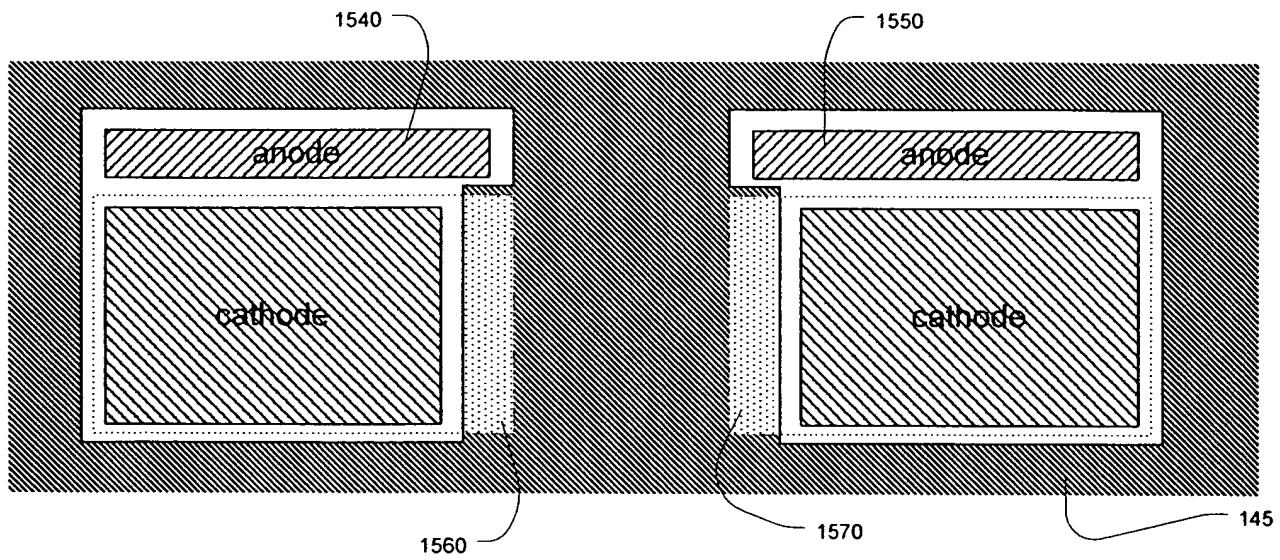
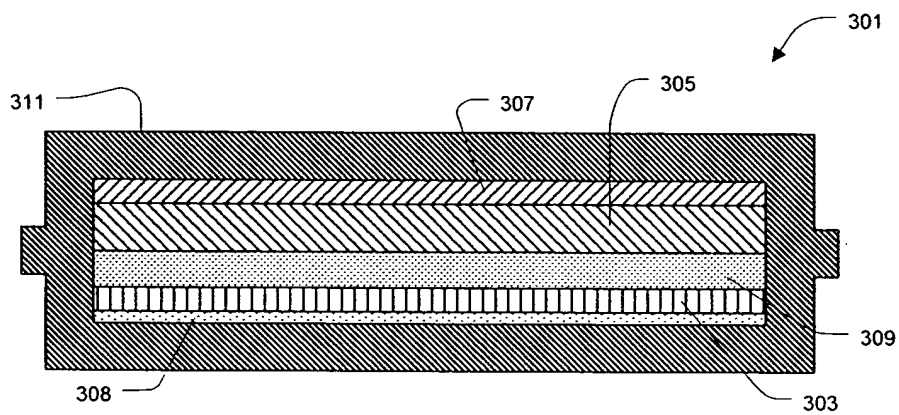


FIG. 13A



Prior Art

FIG. 13B

IN RE GENE R. WILDER

No. 8194

United States Court of Customs and Patent Appeals

57 C.C.P.A. 1314; 429 F.2d 447; 1970 CCPA LEXIS 304; 166 U.S.P.Q. (BNA) 545

Oral argument April 9, 1970 August 13, 1970

PRIOR HISTORY: [*1]**

Appeal from Patent Office, Serial No. 355,473

DISPOSITION-1: Modified.

CASE SUMMARY

PROCEDURAL POSTURE: Appellant sought review of a decision of the Patent Office Board of Appeals, which sustained the rejection of four claims of his application for a type of rubber having minimal toxicity to human skin as unpatentable under 35 U.S.C.S. §§ 102 and 103 over a previously granted patent.

OVERVIEW: Appellant sought review of the board of appeals' decision rejecting four claims of his application for type of rubber as unpatentable under 35 U.S.C.S. §§ 102 and 103 over previous patent. Appellants' claims were based on discovery that his rubber was non-toxic to human skin. The products previously patented were chemically similar to appellant's rubber, but their patent contained no reference to non-toxicity. The court affirmed the rejection of three of appellant's claims on the ground that subject matter being claimed was not novel, noting that the fact that appellant may have discovered an unexpected property in a compound, which was structurally similar to a compound previously patented, was not sufficient to make claimed subject matter unobvious. The court held, however, that appellant had shown that composition at issue in one claim did possess different properties from those possessed by compositions covered by the previous patent and reversed rejection of that claim.

OUTCOME: Board of appeals' decision was affirmed as to three claims because fact that appellant discovered that rubber was non-toxic did not make rubber novel since it was chemically similar to product previously patented, but reversed as to fourth claim because appellant had shown that one compound differed from rubbers previously patented.

COUNSEL: *Ellsworth H. Mosher*, attorney of record, for appellant. *Stevens, Davis, Miller & Mosher*, of counsel.

Joseph Schimmel for the Commissioner of Patents. *Fred W. Sherling*, of counsel.

OPINIONBY: BALDWIN

OPINION: [448]**

[*1315] Before RICH, BALDWIN, LANE, Associate Judges, and JONES, Judge, sitting by designation

BALDWIN, Judge, delivered the opinion of the court:

Wilder has appealed from the decision of the Patent Office Board of Appeals which sustained the rejection of claims 2, 6, 7, 9, 11, 12 and 14 in his application n1 as unpatentable under 35 USC 102 and 35 USC 103 over a patent to Stahly. n2 In his brief, appellant has moved to dismiss the appeal as to claims 11, 12 and 14. That motion is hereby granted, thus leaving claims 2, 6, 7 and 9 for our consideration.

n1 Serial No. 355, 473, filed Mar. 27, 1964, for "Preserving Rubber."

n2 U.S. Patent 3,163,616, granted Dec. 29, 1964, on an application filed Aug. 31, 1956.

The Invention

We note, as did the board, that "the nature of the asserted invention is evident from the reproduced claims." Claims 2 and 7 are representative [***2] [*1316] of the claims now on appeal. We reproduce them, at the suggestion of appellant, in analytical form:

2. Preserved rubber having minimal toxicity to human skin comprising

[1] natural rubber having incorporated therein

[2] an amount sufficient to inhibit degradation of

[a] N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine,

the rubber containing said adjuvant being neither a primary irritant nor a sensitizing agent.

7. Preserved rubber having minimal toxicity to human skin comprising

[1] synthetic sulfur-vulcanizable diene hydrocarbon rubber having incorporated therein

[2] an amount sufficient to inhibit degradation of

[a] N-(1,4-dimethylamyl)-N'-phenyl-p-phenylenediamine,

the rubber containing said adjuvant being neither a primary irritant nor a sensitizing agent.

Claim 6 defines the rubber using the same broad language as claim 7, and recites the same 1,3-dimethylbutyl inhibitor of claim 2. Claim 9 differs from claim 2 only in that the rubber claimed is "unvulcanized styrene-butadiene copolymer". [**449]

For a further understanding of the invention, we quote from appellant's specification:

It has been long recognized that [***3] N-alkyl-N'-phenyl-p-phenylenediamines inhibit the aging of natural rubber. More recently, it was found that N-isopropyl-N'-phenyl-p-phenylenediamine inhibits exposure cracking of synthetic rubber vulcanizates and this compound has come into considerable commercial use for this purpose. However, it is a skin sensitizer and volatile enough to cause numerous cases of skin eruption among workers processing the rubber. Moreover, it is much too soluble in the aqueous coagulation medium used for SBR to be considered for protecting unvulcanized SBR.

Appellant's claims are based on the discovery that rubber containing either of the two specific antidegradants claimed does not have the toxic effect alleged to be possessed by the other N-alkyl-N'-phenyl-p-phenylenediamines.

The Rejections

The examiner rejected the claims on appeal "as unpatentable over Stahly under 35 USC 102." That patent contains what amounts to a generic disclosure, broadly teaching that the entire class of N-alkyl-N'-phenyl-p-phenylenediamines (to which class, appellant's specific adjuvants belong) is effective for preserving all kinds of rubber against the deteriorative action of ozone. Broadly stating first [***4] that the alkyl substitute may be primary, secondary, or tertiary, branched or straight chain and may be substituted with aryl or cycloalkyl groups, the patent disclosure goes on to recite that excellent stabilizing properties are possessed by those phenylenediamines in which the alkyl [*1317] group contains from 1 to 19 carbon atoms and further that members of the class in which alkyl group contains from 1 to 9 carbons "are especially effective."

Becoming more particular, later on, the patent sets out two separate groups of specific phenylenediamines "containing alkyl groups in the preferred range of number of carbon atoms." The first group contains 8 compounds, the alkyl group containing from 3 to 9

carbon atoms and showing most of the stated configurations (e.g. secondary, tertiary, aryl-substituted). The second group recites 16 more alkyl substitutes wherein the number of carbon atoms ranges from 1 to 19 and varying configurations are also indicated. Of this latter group, the express recitations of the 1,3-dimethylbutyl and 1-methylhexyl radicals are of particular interest as they are the specific disclosures upon which the appealed rejections are based.

The method of [***5] incorporating the phenylenediamines into the rubber is taught by Stahly and specific mention of several types of rubbers, all being sulfur-vulcanizable diene hydrocarbon rubbers and including both those specifically recited in the instant claims, is made. Examples describing the preservative effect on various rubbers of several of the N,N'-substituted p-phenylenediamines from both of the groups of specific compounds mentioned earlier are also given.

Stahly's patent contains no express disclosure of the exact compositions defined in the claims now on appeal nor does it contain any hint that his compositions would possess any skin irritating or sensitizing property. Regardless of these facts, the examiner took the position that the claims now before us were anticipated by Stahly's disclosure. While he conceded that the compound recited in claim 7 on appeal was not exactly recited in the patent, he felt that the recited compound and Stahly's 1-methyl hexy variant "may be the same." When appellant submitted affidavits substantiating the asserted advantage of the claimed compositions, the examiner responded:

It is respectfully submitted that even with the affidavit and assuming [***6] that the showings of non-toxicity are completely valid for the compositions so limited by the instant claims, there [**450] can be no patentable invention where novelty does not exist, albeit all of the properties of said compositions were not previously recognized.

* * *

[The] Examiner has not ignored the limitation relative to toxicity, as urged by appellant. However, said limitation has to be considered meaningless when it only goes to describe a property of a composition recited by the instant claims which composition, itself, is shown by the prior art to be lacking in novelty since it is fully anticipated and recited.

The Board of Appeals sustained the rejection, upholding the examiner on all grounds with regard to claims 2, 6 and 9. As to claim 7, the board stated:

[*1318] [The] compound of Stahly relied upon by the Examiner is a position isomer of the compound defined by the claims. However, no showing as to difference in toxicity of these two compounds when incorporated in rubber has been made, and their chemical similarity is apparent. If the compound of Claims 7 and 12 is not fully anticipated under 35 U.S.C. 102, it is obvious under 35 U.S.C. 103. [*7] The rejection of claims 7 and 12 will also be sustained.

Opinion

Considering first the rejection of claims 2, 6 and 9 under 35 USC 102, we have concluded that the rejection is sustainable. Appellant's arguments attacking the position taken by the Patent Office in this rejection appear to be made on three different levels. It is argued initially that the disclosure of the Stahly patent does not anticipate the claimed compositions. Secondly, it is asserted that even though there may be a technical anticipation, the discovery of the new property and the recitation of this property in the claims "lends patentable novelty" to the claims. Finally the court is urged to ignore the "fortuitous suggestions" of the prior art, overrule the "doctrine" of In re Thuau, 30 CCPA 979, 135 F.2d 344, 57 USPQ 324 (1943), and recognize the commercial importance of appellant's discovery.

[1] Employing, if we may, a syllogistic analysis to answer appellant's arguments, we start with the proposition that claims cannot be obtained to that which is not new. This was the basis of the holding in In re Thuau. It was the law then, is now and will be until Congress decrees otherwise. So the first inquiry [*8] must be into exactly what the claims define. Towards that goal, we state the next proposition, which is that every [2] limitation positively recited in a claim must be given effect in order to determine what subject matter that claim defines. [3] However, recitation, in a claim to a composition, of a particular property said to be possessed by the recited composition, be that property newly-discovered or not, does not necessarily change the scope of the subject matter otherwise defined by that claim. No matter how we read appellant's claims, they define nothing other than rubber compositions containing particular rubbers combined with particular antidegradant compounds.

[4] Once having ascertained exactly what subject matter is being claimed, the next inquiry must be into whether such subject matter is novel. If an applicant had to prove novelty before he could obtain a patent he would have an almost insurmountable burden. Therefore, the statute provides for what may be said to be a presumption of novelty in the language of section 102 "a person shall be entitled to a patent unless - " (Emphasis added). What this means, in an ex parte

proceeding to obtain a patent, is [*9] that the Patent Office has the initial burden of coming forward with some sort of evidence tending [*19] to disprove novelty. In this case, the examiner came forward with evidence, i.e., the Stahly patent, tending to show that the subject matter of appellant's claims "was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant." [*451] 35 USC 102(e). Our province now becomes an evaluation of the legal sufficiency of that showing, taking into account appellant's attacks against it, and weighing in any evidence which he might have submitted tending to show the contrary.

[5] Simply stated, a prior publication or patent description will be considered as anticipatory when its disclosure is at once specific and enabling with regard to the particular subject matter at issue. In effect, a prima facie case is made out whenever a reference is shown to contain a disclosure which is specific as to every critical element of the appealed claims. However, such disclosure may yet be held not to legally anticipate the claimed subject matter if it is found not to be sufficiently enabling, in other [*10] words, if it does not place the subject matter of the claims within "the possession of the public." See, e.g., In re LeGrice, 49 CCPA 1124, 301 F.2d 929, 133 USPQ 365 (1962); In re Brown, 51 CCPA 1254, 329 F.2d 1006, 141 USPQ 245 (1964).

Those parts of the reference patent relied on below as making out a specific disclosure of the claimed compositions have been summarized earlier. In arguing against a finding of specific disclosure, appellant emphasizes the fact that there is no express disclosure showing the particular rubber compositions here claimed. He also points out the large number of variations possible with Stahly's disclosure and the fact that "Stahly's singles out the N-isopropyl-N'-phenyl-p-phenylenediamine as unique." On the other hand, we have noted that the particular adjuvant of these claims is one of 24 expressly disclosed as preferred by Stahly. In addition, the reference teaching is broadly enabling with regard to the manner of making and using both the specific adjuvant and the rubber compositions containing it. Furthermore, the patentee mentions no more than about a half dozen rubbers, all of which are "sulfur-vulcanizable diene hydrocarbon" rubbers, as possible [*11] components of the resistant compositions, with particular emphasis being placed on the same two rubbers specifically recited in claims 2 and 9 on appeal. Taking all these factors into account, we are constrained to hold that the Stahly patent does contain what amounts to a specific description of at least those rubber compositions containing either natural rubber or styrenebutadiene

copolymer rubber with each and every one of the 24 adjuvants expressly mentioned. The compositions of claims 2, 6 and 9 are thus specifically described by the reference.

[*1320] [6] Appellant has also submitted evidence, by way of affidavit, showing that the rubber compositions of his claims possess a property unexpectedly superior in a secondary but important characteristic, the hoped-for inference apparently being that if the claimed composition was, in fact, known by the reference patentee, it would have been listed as preferred above all other possibilities, because of this property. If this evidence is submitted in an attempt merely to prove the absence of a physical, tangible existence of the claimed compositions in the prior art it is inapposite, since such proof would not necessarily [***12] negate the fact that the reference does, in fact, describe those very compositions. The statute requires nothing more.

[7] Nor does such evidence require the inference that the compound apparently disclosed by Stahly and the adjuvant recited in the rejected claims are necessarily different. In the past we have accepted such an inference and found no anticipation where it has been proved that a compound apparently specifically described in a reference disclosure could not possibly have been made by the process taught by the reference, In re Jacobs, 50 CCPA 1316, 318 F.2d 743, 137 USPQ 888 (1963), or where the compounds claimed had properties completely different from those attributed to them by the reference description, In re Kalm, 54 CCPA 1466, 378 F.2d 959, 154 USPQ 10 (1967). The evidence submitted here, however, quite reasonably also permits the inference that the reference patentee might only have been unaware of a particular property [**452] of the compound he did disclose. Such proof clearly falls short of defeating a case of anticipation.

With regard to the rejection of claim 7 under 35 USC 103, appellant asserts that he has met his burden of demonstrating unobviousness [***13] by showing the unexpected non-toxicity of his composition and argues that he should not have to conduct experiments to determine the toxicity of rubber containing the isomer mentioned by Stahly. He also points out that he has demonstrated in his affidavits that the six-carbon, 1,3-dimethylbutyl compound of claims 2, 6 and 9 has unexpectedly different properties from its isomers and argues that this fact alone should be enough to support an inference that the properties of the seven-carbon, 1,4-dimethylamyl adjuvant of claim 7 would be similarly different from those of its isomers.

[8] Appellants' first assertion is unacceptable. As we pointed out recently in In re Hoch, No. 8323, decided July 30, 1970, the mere fact that an applicant has

discovered an unexpected property in a compound which is structurally similar to that disclosed in the prior art is not enough, in and of itself, to make his claimed subject matter unobvious. The law is clear in requiring a showing of unexpected differences [***121] between the properties of the compound recited in the instant claimed composition and those possessed by the prior art. n3

n3 It will be apparent that we are treating the instant claims, concededly drawn to compositions, as if the only important element is the antioxidant adjuvant and the rubber merely acts as a matrix or environment wherein the important properties of the adjuvant compound are manifested. In this respect the claims may be said to be similar to those drawn to pharmaceutical or insecticidal compositions similarly containing only a single "active" ingredient. It should also be apparent that this approach cannot be utilized with all claims drawn to compositions.

[***14]

However, we can see no reason why such differences and their unexpected nature may not be demonstrated by other than a direct comparison. The problem is simply one of evidence and it should be a simple matter to accord various types of proofs their appropriate weight. In the present case, appellant's indirect, circumstantial evidence has satisfied us that the composition of claim 7, more likely than not, does possess properties different from those possessed by a composition containing the seven-carbon isomer disclosed by the reference and that such differences would have been unexpected to one having ordinary skill in the art. We hold, therefore, that he has overcome the prima facie showing made by the Patent Office and that the rejection of claim 7 under 35 USC 103 should be reversed.

Summary

The decision of the Board of Appeals is affirmed as to claims 2, 6 and 9 and reversed as to claim 7.

IN RE FERDINAND J. RATTI

No. 6452

United States Court of Customs and Patent Appeals

46 C.C.P.A. 976; 270 F.2d 810; 1959 CCPA LEXIS 162; 123 U.S.P.Q. (BNA) 349

Oral argument May 8, 1959 September 30, 1959

PRIOR HISTORY: [***1]

APPEAL from Patent Office, Serial No. 359,325

DISPOSITION-1: REVERSED.

CASE SUMMARY

PROCEDURAL POSTURE: Appellant applicant sought review of an order from the United States Patent Office Board of Appeals rejecting appellant's claims for a patent.

OVERVIEW: Appellant applicant sought review of an order from the board rejecting appellant's claims for a patent. The district court reversed the board's decision. The district court held that an applicant was entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applied. According to the court, the statutory requirements for patentability, broadly stated, were novelty, usefulness and unobviousness, as provided in 35 U.S.C.S. §§ 101, 102, and 103. The district court then held that the board committed error when it considered matters outside of §§ 101, 102 and 103. The district court held that the intent of Congress was that patentability was to be determined solely by the provisions of §§ 101, 102, and 103.

OUTCOME: The district court reversed the board's decision holding that an applicant was entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applied.

COUNSEL: *Cromwell, Greist & Warden (Raymond L. Greist of counsel)* for appellant.

Clarence W. Moore (S. Wm. Cochran of counsel) for the Commissioner of Patents.

OPINIONBY: SMITH

OPINION: [**810]

[*977] Before WORLEY, Chief Judge, and RICH, MARTIN and SMITH, Associate Judges, and Judge WILLIAM H. KIRKPATRICK n1

n1 United States Senior District Judge for the Eastern District of Pennsylvania, designated to participate in place of Judge O'Connell, pursuant to the provisions of

Title 28, United States Code, Section 294(d).

SMITH, Judge, delivered the opinion of the court:

This is an appeal from the decision of the Board of Appeals of the United States Patent Office affirming the rejection by the Primary Examiner of claims 1, 4, 7, and 10 of appellant's application serial No. 359,325, filed June 3, 1953, for a patent on an "Oil Seal" for sealing the space between a bore in a housing and a relatively movable shaft centrally located in the bore.

Claim 1 is representative of claims 4 and 7 and reads:

1. A seal for insertion in a cylindrical bore in a housing about a relatively movable centrally located [***2] shaft, comprising an annular bore-engaging mounting portion of resiliently deformable material for endwise insertion in and statically sealed engagement with the bore in the housing, an annular shaft-engaging portion connected with said bore-engaging portion for running engagement with the shaft, and a metal ring located adjacent one end of said bore-engaging portion, said ring being provided with a plurality of axially extending outwardly biased spring fingers in outwardly clamped engagement with said bore-engaging portion inwardly of the outer periphery of the latter, and said ring being also provided outwardly of said bore-engaging portion with means for detachably connecting the ring to the housing outwardly of the bore in the latter. [Emphasis ours.]

[*978] Claim 10 differs from the other claims on appeal and reads:

10. A seal for insertion in a cylindrical bore in a housing about a relatively movable centrally located shaft, comprising a sealing ring having an outer bore-engaging portion of resiliently deformable material, which portion is of somewhat larger diameter than the bore in the housing, for press-fit insertion in the bore, and a metal retaining ring associated [***3] with the sealing ring, said retaining ring being connected with [***811] the sealing ring and being provided outwardly of the latter with resiliently yieldable hook formations which are adapted to be sprung into interlocking engagement with a complementary formation associated with the housing outwardly of the bore, which engagement acts to prevent axial displacement

of the sealing ring relative to the bore in the housing. [Emphasis ours.]

The references in the case are:

Roth, 1,546,942, July 21, 1925.

Norton, 1,951,034, March 1, 1934.

Jepson, 2,544,324, March 6, 1951.

Chinnery et al. (British), 578,526, July 2, 1946.

Appellant's shaft seal comprises an annular sealing member of resilient deformable material which is adapted to be inserted into a cylindrical bore surrounding a relatively movable shaft. The inner portion of the sealing member is provided with a flexible lip which is held in engagement with the shaft by a garter spring. In the outer portion of the sealing member, an annular slot is provided which is concentric with and spaced from the outer periphery of the sealing member. This slot extends axially from the end of the member and provides a pocket [***4] in which the axially extending outwardly biased spring fingers of a metallic attaching ring are located. This construction permits the spring fingers to exert a force on the resilient material in the direction of the annular wall of the bore to provide and maintain a snug engagement between the outer surface of the resilient member and the inner surface of the bore. The metallic attaching ring is also provided with radially extending resilient hooks located outwardly of the bore engaging portion of the resilient member. The housing is provided with a complementary formation outwardly of the bore which is engaged by the resilient hooks to provide a snap-on connection between the bore and the seal.

The Roth and Norton patents were relied upon by the examiner in rejecting claim 10, and since both references were considered by the board, we have included them in our consideration of this case. Roth shows a gasket structure for steam train line hose couplings. Norton shows an adjustable repair clamp for bell and spigot joints in which there is provided a sheet metal bridge piece "preferably of spring material." The bridge piece is sprung into interlocking engagement with a structural [***5] portion of the clamp and exerts its [979] force on a resilient packing ring which, if desired, may be cemented to it.

The Chinnery et al. patent is the reference principally relied upon by the Patent Office. It shows a housing provided with a bore surrounding a centrally located shaft. A reinforced and "stiffened" sealing member formed of a material such as rubber, is press fitted into the space between the bore and the shaft. The sealing member has an inner lip held in contact with the shaft by a garter spring. The bore engaging portion of the

sealing member is "stiffened" by an axially extending cylindrical sheet metal casing which acts as a reinforcing member for a definite purpose which is described by Chinnery et al. as follows:

Owing to the limited radial space within which the oil seal is to be accommodated, the holding portion of the oil seal cannot be stiffened by being massive. Consequently the holding portion of the present oil seal is stiffened in the known manner by a reinforcement, which may either encase or line, or alternatively constitute, such holding portion and therefore makes the pressfitting contact with the machine part stationary relatively thereto, [***6] or may be an internal reinforcement in the [812] sense that it does not make press-fitting contact with the machine part stationary relatively thereto. [Emphasis ours.]

In Fig. 8 Chinnery et al. shows a radially extending flange at the outer edge of a reinforcing member of the internal reinforcement type which flange extends beyond the sealing member "to such an extent as to serve as a means of attachment of the oil seal to the housing i, additional to the interference press fit of the holding portion a in the housing recess g." The aforesaid flange is shown attached to the housing by screws or bolts.

The Jepson patent relates to a gasket for sealing the space between the upper and lower vessels of a vacuum-type coffee maker. The gasket is an annular rubber member attached to the lower part of the upper vessel and is designed to fit into the upper part of the lower one. Located in a groove in the gasket is a sleeve member provided with axially and downwardly extending spring fingers which are so biased radially as to urge the lower peripheral portion of the gasket outwardly, thus effecting a tight engagement with the mouth of the lower vessel.

Claims 1, 4, and 7 stand [***7] rejected on Chinnery et al. in view of Jepson, on the ground that it would not require "invention" to replace the cylindrical sheet metal reinforcing member, which is secured to the Chinnery et al. sealing member, by an annular set of outwardly biased spring fingers shown by Jepson.

The problems which were solved by appellant's invention existed in this art at the time of his invention despite the Chinnery et al. disclosures. It was appellant rather than Chinnery et al. who provided [980] the art with a shaft seal in which the resilient element of the seal could be readily inserted into a bore in the housing so that it could be removed from the bore and replaced by a new sealing element without mutilation of the sealing surface of the bore. This is particularly important, the specification points out, where the bore

is formed in light metal alloys such as are used in aircraft engines and which are relatively soft and easily damaged. In appellant's oil seal, the resilient seal is so constructed that when mounted in the bore, it will establish and maintain a fluid tight relationship between the outer peripheral surface of the resilient seal member and the inside of the [***8] bore. Where either natural or synthetic rubber is used as the resilient sealing member in such seals, the rubber in time will take a set or lose its resiliency at least to the extent that the seals soon become ineffective to prevent leakage of oil. When subjected to mechanical pressures and heat, such a rubber sealing element loses its sealing effectiveness at an accelerated rate. The problems in the oil sealing art arising from such use of resilient sealing elements appear to have persisted because of the failure of the art to recognize these characteristics of the rubber sealing element and to so design the resilient element and the mounting therefor as to assure holding the outer circumference of the resilient sealing element in static oil-sealing contact with the inner circumference of the bore in which it is inserted.

Appellant's seal differs from the art of record in at least three respects:

- (1) The provision of the annular slot which extends axially inward from one end of the resilient sealing element. This feature is claimed as part of the combination set forth in claim 4.
- (2) The outwardly biased resilient spring means or fingers inserted in the resilient sealing [***9] element. These means are claimed as part of the combination of claims 1, 4, and 7.
- (3) The "snap-on" connector which holds the resilient sealing element and engages with a complementary formation associated with the housing outwardly of the bore. This feature is in the combination of claim 10.

The patents cited by the examiner, either alone or in combination, do not disclose a resilient shaft sealing element having these features.

[1] It is common knowledge that resilient deformable materials such as either natural or synthetic rubber are [***813] incompressible, that is, while they may be deformed, this can occur only if the design and mounting of the part permits the resilient material to change its shape in response to the applied forces.

[*981] The seal construction disclosed in Chinnery et al. is such that the "interference press fit" which that patent calls for is alone relied on to keep the seal tight. There is nothing in the Chinnery et al. patent to show how the resilient sealing element is maintained in resilient contact with the bore otherwise than by the

resiliency of the rubber. If and when that resiliency is lost, the sealing effect will be impaired. [***10]

Considering the incompressible nature of the rubber in the sealing element disclosed in Chinnery et al., its stiffening and reinforcement by the cylindrical sheet metal member, and its "interference press fit" in the bore, it seems clear to us that the Chinnery et al. seal cannot function in the manner of appellant's seal. Now, as to the contention that Jepson would suggest inserting a set of spring fingers, the resilient element of Chinnery et al. is forced so tightly into the bore and is so "stiffened" that the use of the resilient spring fingers of Jepson could not possibly increase the resilient deformation of the Chinnery et al. seal in the direction of the bore or increase the sealing engagement of the seal with the bore. The teaching of the Chinnery et al. patent points away from the addition of any spring element. On the other hand, we find nothing in the disclosure of Jepson's coffee maker gasket to suggest that any part of it has applicability to shaft seals. The two arts are at least somewhat remote from each other even if they both involve sealing.

We, therefore, find that Chinnery et al. did not teach the shaft sealing art how to solve the problems which existed [***11] in that art at the time of appellant's invention. [2] We hold, further, that the combination of Jepson with Chinnery et al. is not a proper ground for rejection of the claims here on appeal. This suggested combination of references would require a substantial reconstruction and redesign of the elements shown in Chinnery et al. as well as a change in the basic principles under which the Chinnery et al. construction was designed to operate.

Once appellant had taught how this could be done, the redesign may, by hindsight, seem to be obvious to one having ordinary skills in the shaft sealing art. However, when viewed as of the time appellant's invention was made, and without the benefit of appellant's disclosure, we find nothing in the art of record which suggests appellant's novel oil seal as defined in claims 1, 4, and 7.

We shall now consider the rejection of claim 10, remarking first that it differs from claims 1, 4, and 7 in that it is directed to a combination of a housing bore, a resilient sealing ring and a metal retaining ring connected to the sealing ring, wherein the metal ring has resilient hooks which secure the seal in the bore. This claim is not limited to the [***12] outwardly biased spring fingers.

[*982] The examiner rejected claim 10 on two grounds: (1) that substitution for the screw securing means of Chinnery et al. of a series of spring hooks such as disclosed by Norton would not involve

patentable invention, and (2) unpatentability over Roth.

[3] We shall first dispose of the second rejection. The board held that claim 10 is drawn to a combination of a sealing ring and a housing bore in which the sealing ring is detachably placed and that Roth discloses nothing of this nature. The board therefore reversed the rejection on Roth and consequently it is not before us.

As to the first rejection, the board recognized that it was on the ground of unpatentability "over Chinnery et al. in view of Norton" and pointed out that the examiner could see nothing patentable in substituting spring hook attaching means shown in Norton for the screws of Chinnery et al. It then said:

Appellant argues that the references fail to suggest or teach how the proposed [claimed] combination could be made and after a careful consideration of the references, we **[**814]** have concluded that he is correct in this respect. We therefore concede **[**13]** that the claim ******* defines novelty over the disclosure of Fig. 8 of Chinnery et al. Novelty alone however, is no proper basis for the allowance of a claim. [Emphasis ours.]

Although, in reaching this conclusion, the board made no reference to Norton, the context compels the conclusion that novelty was found notwithstanding the disclosure of Norton, taken together with Chinnery et al. [4] We fully agree, of course, with the board's statement that novelty alone is not enough for patentability.

With the next statement of the board, in explanation of its affirmance of the rejection of claim 10, we do not agree. It reads:

In order to properly define invention [meaning, of course, patentable invention], a claim should clearly define a structure which possesses some definite advantage over the prior art. As far as we can determine there is no better combination of housing and seal produced by using a series of snap fastener connections to connect the seal to the housing, as in appellant's structure, over using a series of bolts, as in the structure shown by Chinnery et al. Both act to merely detachably connect one element to another element and as far as we can find are **[**14]** merely equivalent connecting means especially in the absence of any unexpected result or advantage being obtained, by using one means in preference to the other, on which the record before us is entirely silent. [Emphasis ours.]

If we may extract from the foregoing what we understand to be the essence of the board's position in

the matter, it is that claim 10 is not patentable, though it defines a combination which is novel over the disclosures of the references, because the claimed combination has not been shown to be any better than, or to possess any advantage over, what was known to the art.

[*983] As was pointed out in *In re Stempel, Jr.*, 44 C.C.P.A. 820, 241 F.2d 755, 113 USPQ 77, [5] an applicant is entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applies. [6] The statutory requirements for patentability, broadly stated, are novelty, usefulness and unobviousness, as provided in 35 U.S.C. sections 101, 102, and 103. While it is true that proof that an invention is better or does possess advantages may be persuasive of the existence of any one or all of the foregoing three requirements, and hence be indicative **[**15]** of patentability, Congress has not seen fit to make such proof a prerequisite to patentability. n2

n2 A critical essay on the existing law has recently appeared under the title "A Proposal for: A Standard of Patentability; Consonant Statutory Changes; A Manual on Determination of Patentability," by Malcolm F. Bailey, 41 J.P.O.S. 192-225, 231-257. It advocates, as we understand it, that the present law should be changed to set up as the test for patentability, in place of the requirement of section 103 that an invention be unobvious, a requirement that the invention involve progress, which the author finds in the constitutional provisions. Congress has not seen fit to include in the statutes, at any time during the past 169 years so far as we are aware, a requirement that each and every patentable invention shall involve "progress" in this sense, i.e., that each new invention must also be shown to possess some definite advantage over the prior art. The author relates the term "progress" to individual inventions and then gives it the connotation that each such invention should be a technical advance, improvement or betterment. The very making of the suggestion to change the law is an indication that the existing law is otherwise.

[16]**

Appellant's invention, as defined in claim 10, has been held by the board to possess novelty over the disclosure of Chinnery et al. Just what the board thought about the pertinency of Norton is obscure but it seems to have regarded this reference as of little

moment. Appellant in his brief here said that Norton was held by the board to have no bearing on the invention and the Patent Office brief said that the appellant was correct [**815] in so stating and that the court need not consider it. We are, therefore, virtually without any reference against claim 10 except Chinnery et al. and the rejection thereon is predicated solely on a theory of patentability we find to be outside of the patent statutes, namely, that the combination of claim 10 is, by reason of the use of spring retaining hooks instead of a series of bolts, no better than the combination of Chinnery et al. However intriguing such a ground of rejection may be, [7] it is the duty of the tribunals of the Patent Office and of this court to apply the law as Congress has written it. While the provisions of the former R.S. 4893 may be said to have given the Commissioner some discretion in refusing to grant a patent [***17] on an otherwise patentable invention unless "the same is sufficiently useful and important," when the Patent Codification Act of 1952 was enacted, Congress removed this provision from old section 36 of title 35, new section 131. We take this as a further indication that it is the intent of Congress that patentability be determined solely [**984] by the provisions of sections 101, 102, 103. We therefore reverse the board on this ground of rejection of claim 10.

If the issue before us were whether or not the spring hooks are better than the Chinnery et al. bolts - and we consider this in the event we have misapprehended the position of the board - we would hold that they are, on the basis of what is disclosed in the application. This retaining means seems to possess many advantages over screws. Similarly, if the board was intending to say that the hooks and the bolts are merely equivalent connecting means and that claim 10 is unpatentable because its combination differs from the prior art only in the substitution of an equivalent for one element in an old combination, then we would also have to disagree since we think it is clear that the use of the spring hooks produces a [***18] result quite different from the bolts of Chinnery et al. On the record before us no reference relied on shows any spring hooks nor does it contain any support for the contention that bolts and spring hooks are equivalents.

For the foregoing reasons we reverse the rejection of claim 10.

The rejections of claims 1, 4, 7, and 10 are reversed.

MARTIN, J., concurs in result.

DISSENTBY: KIRKPATRICK

DISSENT: KIRKPATRICK, J., dissenting, in which Worley, C.J., joins.

I think that the board's rejection of claims 1, 4, and 7 should be affirmed. The central idea and the most important feature of these three claims, as well as of allowed claim 5, is the exertion of outwardly directed pressure upon the bore engaging portion of the sealing member, the result accomplished being to counteract the tendency of rubber to "set" or lose its resiliency and so become ineffective to prevent leakage. Jepson comes very close to completely anticipating this feature of the patent. All that would be necessary to make the anticipation complete would be to provide the Jepson seal with a shaft engaging portion and, incidentally, claim 7 does not specify any shaft engaging portion.

Of course, it was necessary [***19] that the seal be attached to the bore in a manner to prevent its displacement. Chinnery provides a flange and screws for this purpose and none of the three claims referred to calls for anything more specific than "means." Thus it seems clear that claims 1, 4, and 7 show no patentable novelty as against the prior art of Chinnery plus Jepson.

The only question is whether Jepson is in a nonanalogous art sufficiently remote from that of the application to put it beyond the probability that it would be considered by persons skilled in the art [**985] endeavoring to solve the problem to the solution of which the application is directed. I do not think that it is. Jepson was trying to meet exactly the same problem as the application under consideration, namely, to provide a compressible [**816] seal which could be readily detached or inserted in a cylindrical bore which would maintain a firm and leakproof seat on the bore when in place. I agree with the Solicitor's argument that one seeking to improve a machinery seal would reasonably be expected to investigate not only machinery seals but seals in other arts where similar problems would be encountered. See In re O'Connor, [***20] 34 C.C.P.A. 1005, 161 F.2d 221, 73 USPQ 433.

Claim 10 stands on a somewhat different basis. This claim entirely omits what I think, and have stated above, to be the heart of the application. In substance, claim 10 really amounts to no more than a claim for a hook formation to interlock with the housing of a bore in order to hold a press fit seal in place. n3 Chinnery discloses means to serve the same purpose consisting of screws.

n3 Chinnery discloses a press fit seal, but no one has suggested that there is anything new about such a device and the specification of the application before us concedes that it is old in the art.

The board conceded that the combination disclosed in claim 10, consisting of spring hooks to fasten a press fit seal to the bore, disclosed novelty over Chinnery but not patentable novelty.

I do not read the opinion of the board as predicated its conclusion of want of invention on the theory that in order to be patentable a combination must have some distinct advantage over the prior art. The board stated that there was nothing in the record to show that the substitution of hooks for screws produced any unexpected result or advantage and, therefore, [***21] concluded that the introduction of hooks did not create patentable novelty, but was a mere substitution of equivalents. The statement that the spring hooks of Ratti were no better than the screws of Chinnery was directed toward this point and seemingly was added to fortify the board's finding of equivalency rather than to propound a theory of patentability. I agree with the board that this claim, though it may show novelty over Chinnery, does not show patentable novelty, and I would affirm its rejection.

Express Mail Label No.:

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

John W. Countz

Appln. No.: 10/642,359

Filed: August 15, 2003

Title: Positive Atmosphere Packaging Press Sealer

Examiner: S. Tawfik

Group Art Unit: 3721

APPELLANT'S BRIEF

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TABLE OF CONTENTS

	Page
TABLE OF CASES AND OTHER AUTHORITIES.....	ii
Federal Circuit and Predecessors	ii
Manual of Patent Examining Procedure	ii
 APPELLANT’S BRIEF	1
Real Party In Interest	1
Related Appeals and Interferences.....	1
Status of Claims	1
Status of Amendments	1
Summary of Claimed Subject Matter.....	1
Grounds of Rejection to be Reviewed	2
Summary of Invention	2
Issues.....	3
Grouping of Claims.....	4
Argument	4
(i) Claim Rejections – 35 U.S.C. § 102(b)	4
(a) Rejection of claims 1-4, 6-9, and 18-20 as anticipated by Atkins et al.	4
(1) The anticipation rejection based on Atkins et al. should be withdrawn because Atkins et al. fail to disclose various elements of independent claims 1 and 18, including “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.”	4
(ii) Claim Rejection – 35 U.S.C. § 103(a)	7
(a) Rejection of claim 5 as obvious over Atkins et al.	8
(1) The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.	8
(2) The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a gas inlet for injecting gas into the packaging material to purge an interior of the packaging material before compressing the packaging material, wherein the gas is selected from the group consisting of Ar, CO ₂ , or CO.	9
Conclusion	10
 APPENDIX for Appellant’s brief	A-1
Claims Appendix	A-2
U.S. Patent 4,457,122 to Atkins et al. (“Atkins”)	Tab 1

TABLE OF CASES AND OTHER AUTHORITIES

Federal Circuit and Predecessors

Trintec Industries, Inc. v. Top-U.S.A. Corp., 295 F.3d 1292 (Fed. Cir. 2002).

In re Haruna, 249 F.3d 1327 (Fed. Cir. 2001).

Brown & Williamson Tobacco Corp. v. Philip Morris, Inc., 229 F.3d 1120 (Fed. Cir. 2000).

Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565 (Fed. Cir. 1991).

Richardson v. Suzuki Motor Co., 868 F.2d 1226 (Fed. Cir. 1989).

Ex parte Clapp, 227 USPQ 972 (Bd. Pat. App. & Inter. 1985).

In re Royka, 490 F.2d 981 (C.C.P.A. 1974).

In re Wilder, 429 F.2d 447 (C.C.P.A. 1970).

In re Ratti, 270 F.2d 810 (C.C.P.A. 1959).

Manual of Patent Examining Procedure

MPEP § 2131.

MPEP §2142.

MPEP §2143.

APPELLANT'S BRIEF

This appeal is taken in response to the Final Office Action of February 22, 2005, wherein all of the pending claims of U.S. Patent Application No. 10/642,359 were finally rejected.

REAL PARTY IN INTEREST

The real party in interest is Excel Corporation as evidenced by the Assignment recorded at Reel 014784, Frame 0991.

RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences related to this appeal.

STATUS OF CLAIMS

Claims 1-9 and 18-20 are pending. All of these pending claims are under final rejection. Specifically, the Final Office Action rejected:

- (a) claims 1-4, 6-9, and 18-20 under 35 U.S.C. § 102(b); and
- (b) claim 5 under 35 U.S.C. § 103(a).

Claims 1-9 and 18-20 are appealed. A copy of the appealed claims appears in the Appendix.

STATUS OF AMENDMENTS

Claim 1 was amended in an Amendment after Final Rejection dated April 21, 2005. That amendment was entered, as indicated in the Advisory Action dated May 13, 2005.

SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1 and 18 are independent.

Claim 1 recites a positive-pressure packaging system 30 comprising a platen 33, a dome 34, a seal assembly 50, and a pressure source 40. The platen 33 for receiving a product and a packaging material and the dome 34 moveable to a first position relative to the platen wherein the product may be placed on the platen, and a second position relative to the platen wherein the product is substantially enclosed inside of a pressure chamber defined by the platen and the dome, are discussed at least at paragraphs [013] and [014] of the present application, at page 3, line 23 through page 4, line 10. The seal assembly 50 for operatively coupling the dome to the platen in the second position and for straitening the open end, wherein the seal assembly is adapted to allow expulsion of fluids from the pressure chamber, is discussed at least at paragraph [020] of the present application, at page 6, lines 12-14. The pressure source 40 operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the

packaging material is compressed against the product is discussed at least at paragraphs [016] through [018] of the present application, at page 4, lines 20-22 and page 5, line 1 through page 6, line 2.

Claim 18 recites a positive-pressure packaging system 30 comprising a platen 33, a pressure dome 34, a seal assembly 50, a pressure source 40, and a sealing device 53. The platen 33 having a substantially flat surface and the pressure dome 34 moveable between a first open position relative to the platen wherein the flat surface is exposed to ambient pressure, and a second closed position relative to the platen substantially sealing the dome against the platen to form a pressure chamber, are discussed at least at paragraphs [013] and [014] of the present application, at page 3, line 23 through page 4, line 10. The seal assembly 50 for corrugating an open end of a package located on the flat surface as the dome moves to the second position is discussed at least at paragraph [020] of the present application, at page 6, lines 12-14. The pressure source 40 coupled to the dome for increasing pressure within the pressure chamber relative to the ambient pressure so that the open package is compressed against the product, wherein the seal assembly allows expulsion of fluids from the package through the open end thereof and inhibits expulsion of a particulate, is discussed at least at paragraphs [016] through [018] of the present application, at page 4, lines 20-22 and page 5, line 1 through page 6, line 2. The sealing device 53 on at least one of the platen and the dome and configured to seal the package after the package has been compressed is discussed at least at paragraph [023] of the present application, at page 7, lines 16-29.

GROUND OF REJECTION TO BE REVIEWED

Claims 1-4, 6-9, and 18-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,457,122 to Atkins et al.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,457,122 to Atkins et al.

SUMMARY OF INVENTION

The present invention relates to a positive-pressure packaging system for packaging a product. The positive-pressure packaging system includes a platen, a dome, a seal assembly, and a pressure source:

The system includes a platen for receiving a product and a packaging material having an open end and a dome moveable to a first position relative to the platen wherein the product may be

placed on the platen, and a second position relative to the platen wherein the product is substantially enclosed inside of a pressure chamber defined by the platen and the dome. A seal assembly operatively couples the dome to the platen in the second position and straitens the open end. The seal assembly is adapted to allow expulsion of fluids from the pressure chamber. The system further includes a pressure source operably coupled with the dome for increasing pressure within the dome so that the packaging material is compressed against the product.

Specification As Filed, ¶006, page 2, lines 2-12. A rise in pressure, or a positive pressure, within the dome, compresses a bag, or packaging material, around the product:

In general, the pressure dome 34 functions to substantially enclose the open bag 32, and the product 31 contained therein, and to facilitate a rise in pressure within the pressure chamber 35. This rise in pressure compresses the walls of the open bag around the product 31, which may also lead to some compression of the product 31.

Specification As Filed, ¶018, page 5, lines 16-20.

More specifically, air or gas is supplied to the pressure chamber and the air or gas generates a rise in pressure in the pressure chamber, thereby applying direct positive pressure to the bag. The applied pressure compresses the bag against the product:

Incoming air through the pressure chamber ports 48 pressurizes the volume within the pressure chamber 35 and applies direct pressure to the outside of the bag 32, which contains both the product 31 and any residual air or atmosphere trapped inside the bag 32. The force of the applied pressure on the outside of the bag 32 compresses the open bag 32 against the product 31. As the open end of the bag 32 is restricted but nonetheless fluidly coupled to ambient or atmospheric pressure through seal assembly 50, the applied pressure compressing the bag 32 effects expulsion of residual atmosphere or air trapped inside the bag 32.

Specification As Filed, ¶028, page 9, line 27 – page 10, line 5.

ISSUES

- (i) Are the inventions defined in claims 1-4, 6-9, and 18-20 anticipated by U.S. Patent 4,457,122 to Atkins et al. (“Atkins et al.”) under 35 U.S.C. § 102(b)?
- (ii) Is the invention defined in claim 5 obvious over Atkins et al. under 35 U.S.C. § 103(a)?

GROUPING OF CLAIMS

The claims stand or fall together.

ARGUMENT

(i) Claim Rejections – 35 U.S.C. § 102(b)

(a) *Rejection of claims 1-4, 6-9, and 18-20 as anticipated by Atkins et al.*

- (1) **The anticipation rejection based on Atkins et al. should be withdrawn because Atkins et al. fail to disclose various elements of independent claims 1 and 18, including “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.”**

The Final Office Action rejected claims 1-4, 6-9, and 18-20 under 35 U.S.C. § 102(b) as being anticipated by Atkins et al. It is respectfully submitted that this rejection should be withdrawn because Atkins et al. fail to disclose each claim element.

For a prior art reference to anticipate a patent claim, the reference must expressly or inherently describe each and every limitation set forth in the patent claim. Trintec Industries, Inc. v. Top-U.S.A. Corp., 295 F.3d 1292, 1295 (Fed. Cir. 2002); MPEP § 2131. Every claim limitation positively recited must be given effect. In re Wilder, 429 F.2d 447, 450 (C.C.P.A. 1970). “The identical invention must be shown in as complete detail as is contained in the ... claim.” Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236 (Fed. Cir. 1989). There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1576 (Fed. Cir. 1991).

Appellant’s independent claim 1 in part recites, “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the packaging material is compressed against the product.” Appellant’s independent claim 18 in part recites, “a pressure source operably coupled with the dome for increasing pressure within the pressure chamber relative to the ambient pressure so that the open package is compressed against the product, wherein the seal assembly allows expulsion of fluids from the package through the open end thereof and inhibits expulsion of a particulate.”

Atkins et al. cannot anticipate the claims because it does not disclose increasing the pressure pursuant to a positive-pressure packaging system. Instead it discloses a vacuum packaging system. More specifically, Atkins et al. disclose a system for “vacuum packaging goods in heat shrinkable, thermoplastic bags in a vacuum chamber equipped with flexible, heated

diaphragms that can be collapsed upon a filled bag to heat to shrinking temperature.” *Atkins et al., Abstract*. Thus, unlike claims 1 and 18, Atkins et al. do not disclose “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.”

Using a positive pressure device is very different from using a vacuum device. Vacuum packaging devices generate a negative pressure within a bagged product that is inside, for example, a clamshell or platen within a dome chamber. The bag is then heat-sealed closed while under the generated vacuum. Producing vacuum energy with conventional vacuum packagers is expensive and evacuation of the bag-sealing chamber is time consuming. Further, the vacuum packagers generally do not efficiently compress the packaging tightly around the packaged product.

Atkins et al. disclose their device as follows. The system of Atkins et al. comprise an outer vacuum chamber having an upper platen and a lower platen. *Atkins et al., Column 3, lines 13-19*. A product “P”, pre-packaged into a bag “B” is put inside the vacuum chamber. *Column 3, lines 25-28*. Identical diaphragms are fixed to the lips of the upper and lower platens. *Atkins et al., Column 3, lines 33-36*. The diaphragms are deliver heat to the bagged goods and operate to heat shrink the bag onto the goods. *Atkins et al., Column 2, lines 53-64*. A vacuum V_D is drawn between the diaphragms and the platens to expand the diaphragms into contact with the platens:

As is quite clearly apparent from the FIGS. 1 and 2, when V_D is applied, the diaphragms expand out into contact with the platens, as shown in FIG. 3. When this pressure is relieved, as indicated in FIG. 4, then the diaphragms collapse onto the product “P”.

Atkins et al., Column 3, lines 53-58. A vacuum V_C is drawn in the vacuum chamber to evacuate the air from inside and outside of the bag. *Atkins et al., Column 5, lines 47-49*. The vacuum V_D is between the diaphragms and the platens is released while the vacuum V_C in the vacuum chamber is maintained:

The vacuum pressure V_D on the diaphragms is released or vented to atmosphere while the vacuum pressure in the chamber V_C continues.

Atkins et al., Column 5, lines 64-66. Venting to atmosphere between the diaphragms and the platens collapses the diaphragms onto the bag or product, thereby heat shrinking the bag. *Atkins et al., Column 5, line 66 – Column 6, line 1.* The diaphragms collapse onto the bag because there is a vacuum between the diaphragms and the bag – not because the device uses “increase[ed] pressure ... relative to the ambient pressure,” as recited in every claim of the present application.

The Final Office Action asserts:

Atkins clearly discloses “a pressure source operably coupled with the dome for increasing pressure withing [sic] the dome”; Fig. 3; via by [sic] vacuuming the air out from dome 14 through conduits 30 and then releasing the vacuum means and allowing the atmospheric air to get in as shown in Fig. 4; that [sic] consider as pressure source because the atmospheric air will strongly get inside the dome 14 through conduits 30, which is source of pressure applied inside dome 14.

February 22, 2005 Final Office Action, page 5. Figure 4 of Atkins et al. illustrates a condition wherein a vacuum pressure is continued in the chamber, the vacuum condition collapsing and shrinking the bag driven by the hot diaphragms onto the product. *See Atkins et al., Column 5, line 64 – Column 6, line 2.* Atkins et al. explicitly state that the vacuum pressure in the chamber V_C is continued to cause the diaphragms to collapse and shrink the bag against the product. There plainly is no pressure greater than ambient used anywhere in the Atkins et al. device.

An Advisory Action revises the argument, stating that the vacuum is an equivalent to a pressure source:

the examiner still believes that Atkins’s applied vacuum is equivalent to pressure source relative to the ambient. Note that it is inherent the pressure source is somehow coupled with the dome.

May 13, 2005, Advisory Action, continuation sheet. The Examiner thus argues that a vacuum used to pull a diaphragm against a bag in a chamber remaining under vacuum is an equivalent of a pressure source relative to ambient. A vacuum used to pull a diaphragm against a bag in a chamber remaining under vacuum is not “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure,” sufficient to support a rejection of the pending claims under § 102(b) as anticipated by Atkins et al.

First, the Appellant respectfully asserts that, even if a vacuum and/or releasing a vacuum to allow atmospheric air to press a diaphragm against a bag in a chamber remaining under vacuum were an equivalent to a pressure source for increasing pressure relative to the ambient

pressure, an equivalent is not an appropriate basis for an anticipation rejection under 35 U.S.C. § 102(b). For a reference to anticipate a claim, the identical invention must be shown in as complete detail as is contained in the claim. Atkins et al. do not show, at all, much less in any detail, a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.

Second, the Appellant respectfully submits that a vacuum and/or releasing a vacuum to allow atmospheric air to press a diaphragm against a bag in a chamber remaining under vacuum is not an equivalent of a pressure source for increasing pressure relative to the ambient pressure. The vacuum V_C in the vacuum chamber of Atkins et al. is maintained while the vacuum V_D between the diaphragms and the platens is vented. This vacuum causes the diaphragms to collapse on the bagged product, thereby heat-shrinking the bag onto the product. Thus, Atkins et al. describe that the vacuum pump evacuates air from inside and outside of the bag. *Atkins et al.*, Column 5, lines 47-49. This vacuum is not released until the packaging has been completed. *Atkins et al.*, Column 6, lines 3-12. This is not the same as, or an equivalent of, increasing pressure within the dome relative to ambient pressure. At best, Atkins et al. teach applying a vacuum pressure in the chamber and venting the diaphragms to atmosphere to allow pressure up to atmospheric pressure to press the diaphragms to the bag and heatshrink the bag. Atmospheric pressure is not increased pressure relative to ambient.

Further, a vacuum pump for drawing a vacuum within a vacuum chamber cannot fairly be considered a pressure source for increasing pressure in a dome relative to ambient pressure.

Thus, the Appellant respectfully submits that Atkins et al. fail to disclose, either literally or via equivalents, a “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure,” as recited by claims 1 and 18. For at least this reason, it is respectfully submitted that the Final Office Action fails to establish a prima facie case of anticipation for independent claims 1 and 18, and their dependent claims 2-4, 6-9, 19, and 20.

(ii) Claim Rejection – 35 U.S.C. § 103(a)

In order for a reference to establish a prima facie case of obviousness, three requirements must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Brown & Williamson Tobacco Corp. v. Philip Morris, Inc., 229 F.3d 1120, 1124-25 (Fed. Cir.

2000); *MPEP* §2143. Second, there must be a reasonable expectation of success. *Id.* Finally, the prior art reference must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974); *MPEP* §2143. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972,973 (Bd. Pat. App. & Inter. 1985); *MPEP* §2142.

Obviousness can only be established by modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references itself or in the knowledge generally available to one of ordinary skill in the art. *MPEP* §2143.01. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the reference are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810 (C.C.P.A. 1959); *MPEP* §2143.02. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be led in a direction divergent from the path that was taken by the applicant.” *In re Haruna*, 249 F.3d 1327, 1335 (Fed. Cir. 2001).

(a) *Rejection of claim 5 as obvious over Atkins et al.*

The Final Office Action rejected claim 5 under 35 U.S.C. § 103(a) over *Atkins et al.* It is respectfully submitted that this rejection should be withdrawn, because *Atkins et al.* fail to teach or suggest each claim element.

- (1) **The obviousness rejection based on *Atkins et al.* should be withdrawn because *Atkins et al.* fails to teach or suggest a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure.**

Appellant’s independent claim 1 in part recites, “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the packaging material is compressed against the product.” Claim 5 depends indirectly from claim 1.

As discussed above, *Atkins et al.* disclose a vacuum pressure packaging system for packaging goods in heat shrinkable, thermoplastic bags. *Atkins et al.* do not disclose a positive-

pressure packaging system including “a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure,” as recited by claim 1. Nothing in Atkins et al. suggests a positive pressure packaging system.

Three requirements must be met for a reference to establish a prima facie case of obviousness: (1) there must be some suggestion or motivation to modify the reference; (2) there must be a reasonable expectation of success; and (3) the prior art reference must teach or suggest all the claim limitations. Atkins et al. teach a vacuum pressure packaging system; the requisite suggestion, teaching, or motivation for modifying Atkins et al. to produce a positive-pressure packaging system is lacking. Atkins et al. do not teach or suggest any manner of successfully providing a positive-pressure system. Lastly, Atkins et al. do not teach, in any form, a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure. Instead, by teaching use of a vacuum, Atkins et al. teach away from the use of positive-pressure.

Therefore, it is respectfully submitted that the Final Office Action fails to establish a prima facie case of obviousness as to rejected claim 5.

- (2) **The obviousness rejection based on Atkins et al. should be withdrawn because Atkins et al. fails to teach or suggest a gas inlet for injecting gas into the packaging material to purge an interior of the packaging material before compressing the packaging material, wherein the gas is selected from the group consisting of Ar, CO₂, or CO.**

Appellant’s claim 5, including the limitation from claim 4, from which it depends, in part recites, “a gas inlet for injecting gas into the packaging material to purge an interior of the packaging material before compressing the packaging material, wherein the gas is selected from the group consisting of Ar, CO₂, or CO.”

Atkins et al. teach evacuating air from inside and outside of the bag. *Atkins et al.*, Column 5, lines 47-49. There is no teaching or suggestion of injecting gas into the bag prior to compressing the packaging material. Indeed, Atkins et al. appear to teach away from injecting gas into the bag insofar as injecting gas is counter to evacuating air to draw a vacuum.

For at least this reason, it is respectfully submitted that Atkins et al. does not provide a teaching that covers all elements of claim 5 and its base claim 1 and therefore fails to establish a prima facie case of obviousness against claim 5.

CONCLUSION

In light of the foregoing, the Appellant submits that the appealed claims meet the requirements for patentability. Therefore, the Appellant respectfully requests that the Board reverse and withdraw each of the rejections.

Respectfully submitted,

DORSEY & WHITNEY LLP

Customer Number 32320

Date: October 31, 2005

By: Alicia Griffin Mills
Alicia Griffin Mills, Reg. No. 46,933

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:)	
)	
John W. Countz)	Examiner: S. Tawfik
)	
Appln. No.: 10/642,359)	Group Art Unit: 3721
)	
Filed: August 15, 2003)	
)	
<u>Title: Positive Atmosphere Packaging Press Sealer</u>)	

APPENDIX

For Appellant's Brief

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PENDING CLAIMS

1. A positive-pressure packaging system comprising:
 - a platen for receiving a product and a packaging material having an open end;
 - a dome moveable to a first position relative to the platen wherein the product may be placed on the platen, and a second position relative to the platen wherein the product is substantially enclosed inside of a pressure chamber defined by the platen and the dome;
 - a seal assembly for operatively coupling the dome to the platen in the second position and for straitening the open end, wherein the seal assembly is adapted to allow expulsion of fluids from the pressure chamber; and
 - a pressure source operably coupled with the dome for increasing pressure within the dome relative to the ambient pressure so that the packaging material is compressed against the product.
2. The system of claim 1 further comprising a sealing device on at least one of the platen and the dome configured to seal the packaging material after the packaging material has been compressed.
3. The system of claim 2 wherein the sealing device includes a heating element configured to provide the package with a hermetic seal.
4. The system of claim 2 further comprising a gas inlet for injecting a gas into the packaging material to purge an interior of the packaging material before compressing the packaging material.
5. The system of claim 4 wherein the gas is selected from the group consisting of Ar, CO₂, or CO.
6. The system of claim 1 wherein the pressure source includes an air compressor operably coupled with the dome to provided pressurized air to the pressure chamber.

7. The system of claim 1 wherein the pressure source includes an expandable bladder configured to expand and exert pressure against the packaging material.

8. The system of claim 1 wherein the seal assembly is a labyrinth structure that allows passage of fluids and obstructs passage of particulates.

9. The packager of claim 1 wherein the packaging material includes multiple layers of a webbing.

10-17.(Canceled)

18. A positive-pressure packaging system comprising:
a platen having a substantially flat surface;
a pressure dome moveable between a first open position relative to the platen wherein the flat surface is exposed to ambient pressure, and a second closed position relative to the platen substantially sealing the dome against the platen to form a pressure chamber;
a seal assembly for corrugating an open end of a package located on the flat surface as the dome moves to the second closed position;
a pressure source operably coupled with the dome for increasing pressure within the pressure chamber relative to the ambient pressure so that the open package is compressed against the product, wherein the seal assembly allows expulsion of fluids from the package through the open end thereof and inhibits expulsion of a particulate; and
a sealing device on at least one of the platen and the dome configured to seal the package after the package has been compressed.

19. The system of claim 18 wherein the seal assembly includes a first labyrinth structure provided on the flat surface of the platen, and a second labyrinth structure provided on the pressure dome, the first and second labyrinth structures being engageable so as to form a closed

seal that allows the passage of fluids under increased pressure.

20. The system of claim 19 wherein the sealing device includes a first heat-sealing component on the platen, and a second heat-sealing component on the pressure dome and positioned to substantially abut against the first heat-sealing component when the pressure dome is in the closed position.

United States Patent [19]

Atkins et al.

[11] Patent Number: 4,457,122

[45] Date of Patent: Jul. 3, 1984

[54] VACUUM PACKAGING GOODS IN HEAT SHRINKABLE PLASTIC BAGS USING FLEXIBLE DIAPHRAGMS

[75] Inventors: J. Harell Atkins, Duncan; Joseph E. Owensby, Spartanburg, both of S.C.

[73] Assignee: W. R. Grace & Co., Cryovac Div., Conn.

[21] Appl. No.: 295,155

[22] Filed: Aug. 21, 1981

[51] Int. Cl.³ B65B 31/02

[52] U.S. Cl. 53/434; 53/512; 53/442; 53/557

[58] Field of Search 53/434, 442, 512, 557

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Primary Examiner—Kuang Y. Lin

Assistant Examiner—Kurt Rowan

Attorney, Agent, or Firm—John J. Toney; William D. Lee, Jr.; Joseph P. Harps

[57] ABSTRACT

A method and apparatus for vacuum packaging goods in heat shrinkable, thermoplastic bags in a vacuum chamber equipped with flexible, heated diaphragms that can be collapsed upon a filled bag to heat it to shrinking temperature.

15 Claims, 5 Drawing Figures

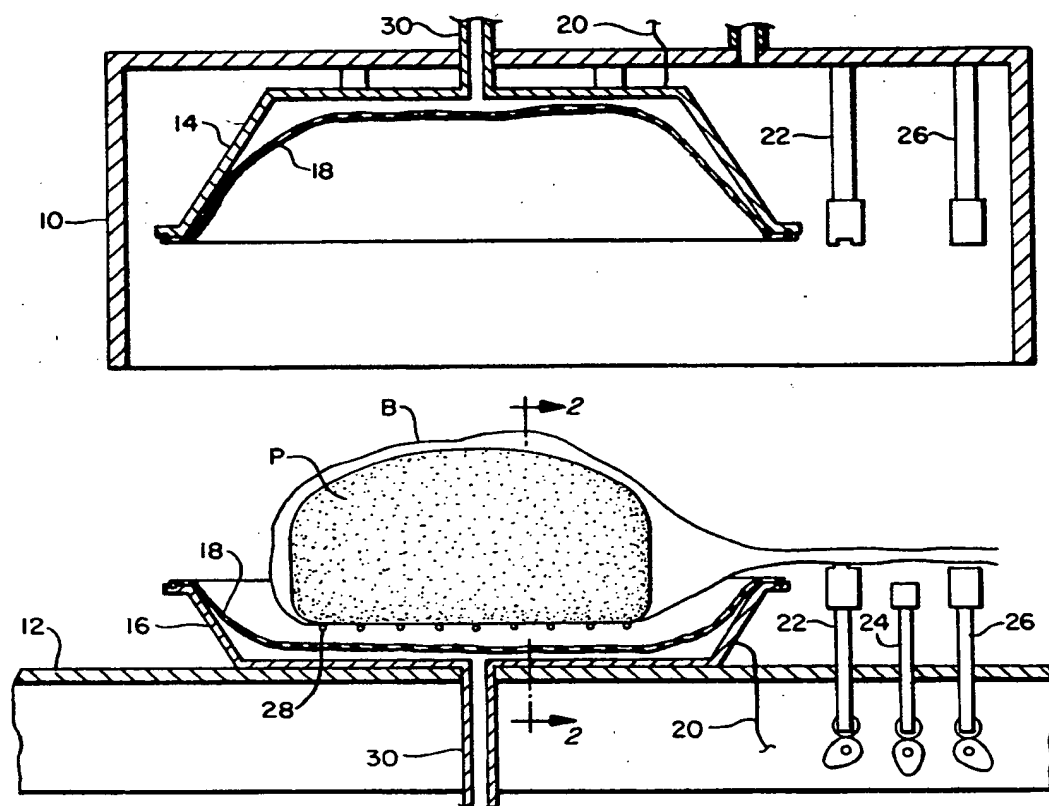


FIG. 1.

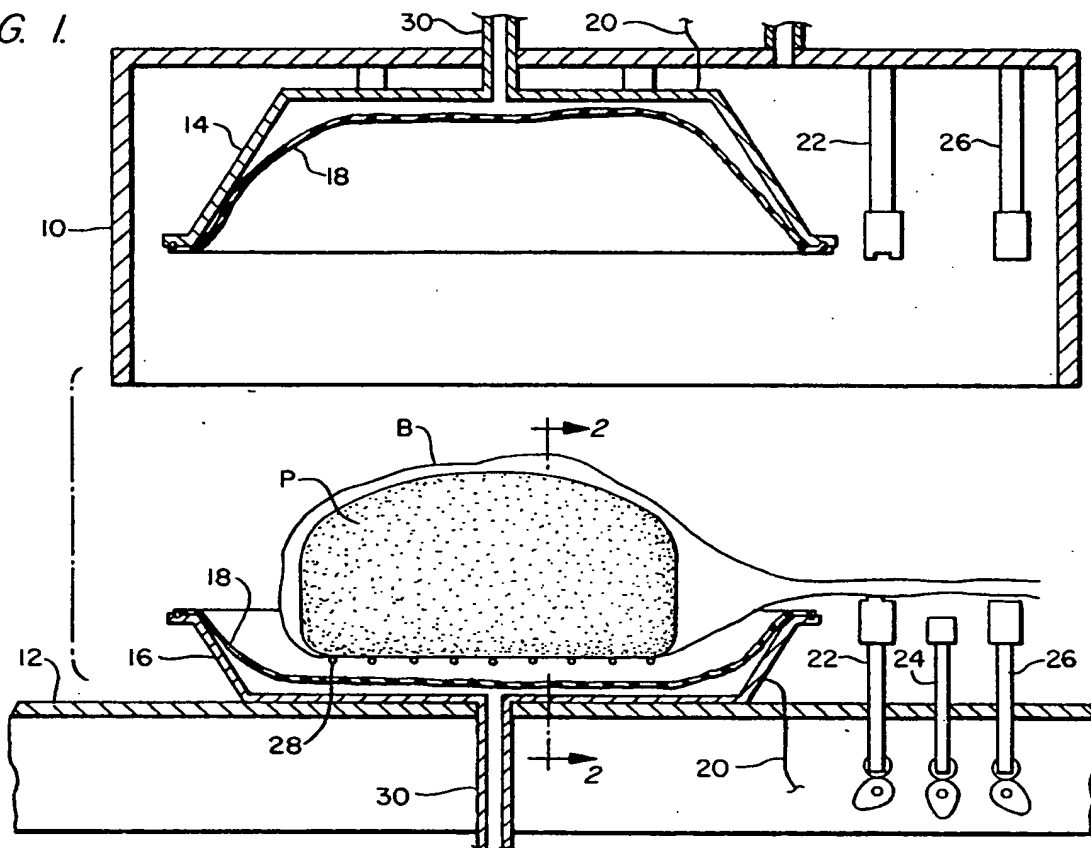


FIG. 3.

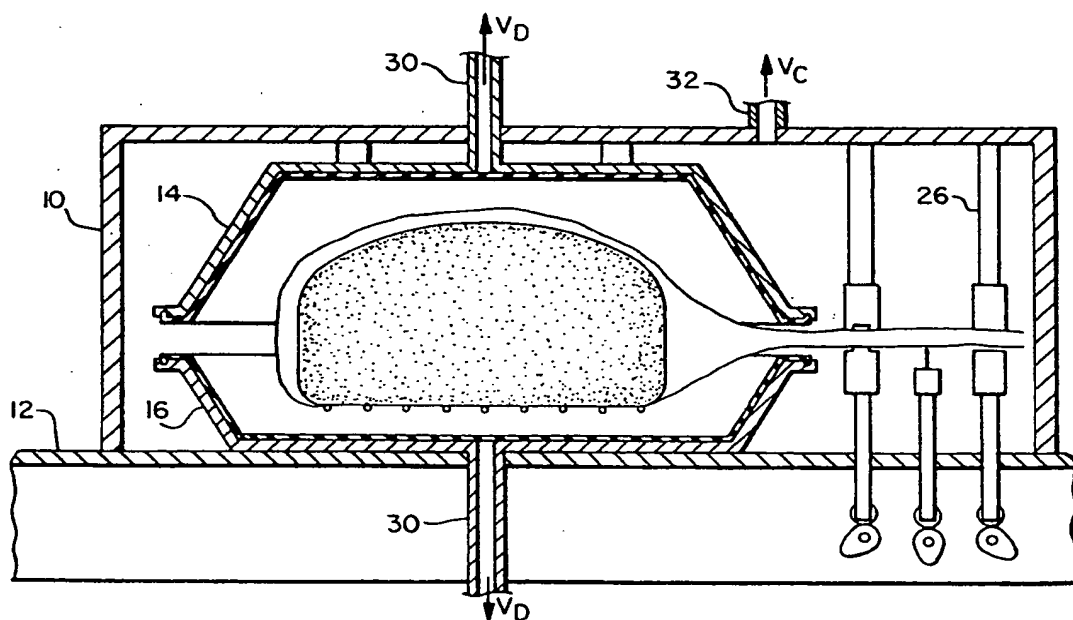


FIG. 2.

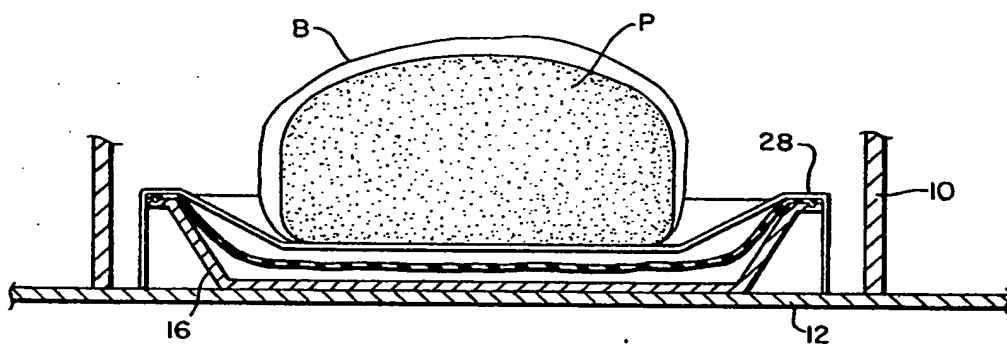


FIG. 4.

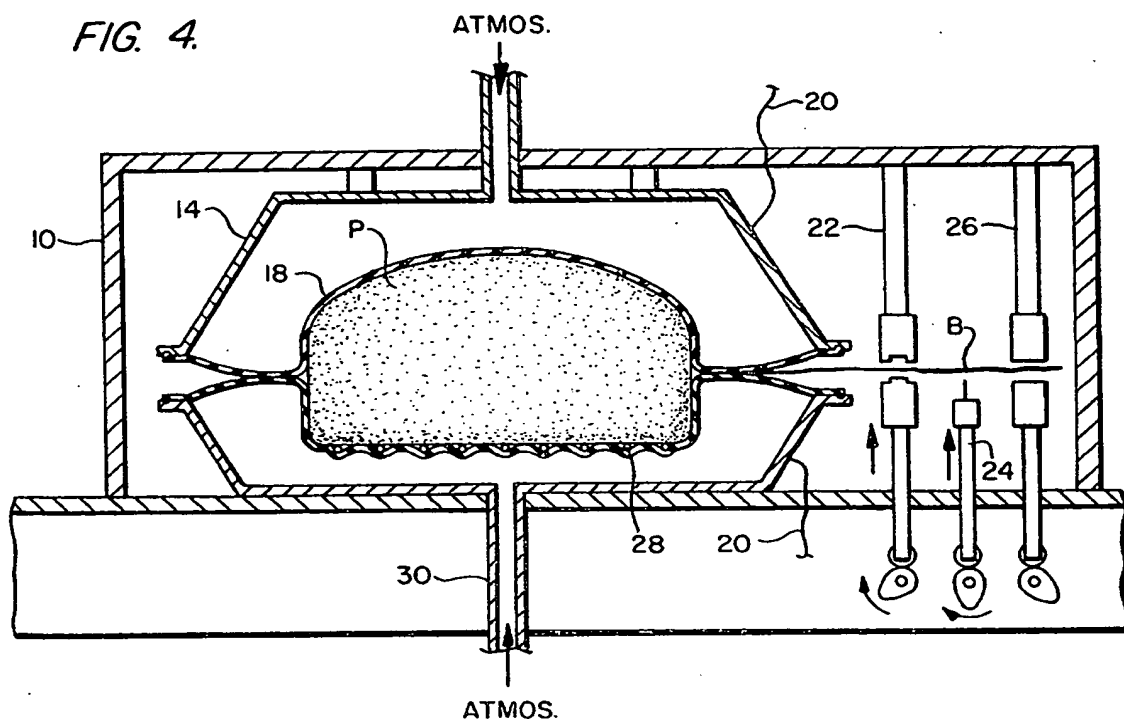
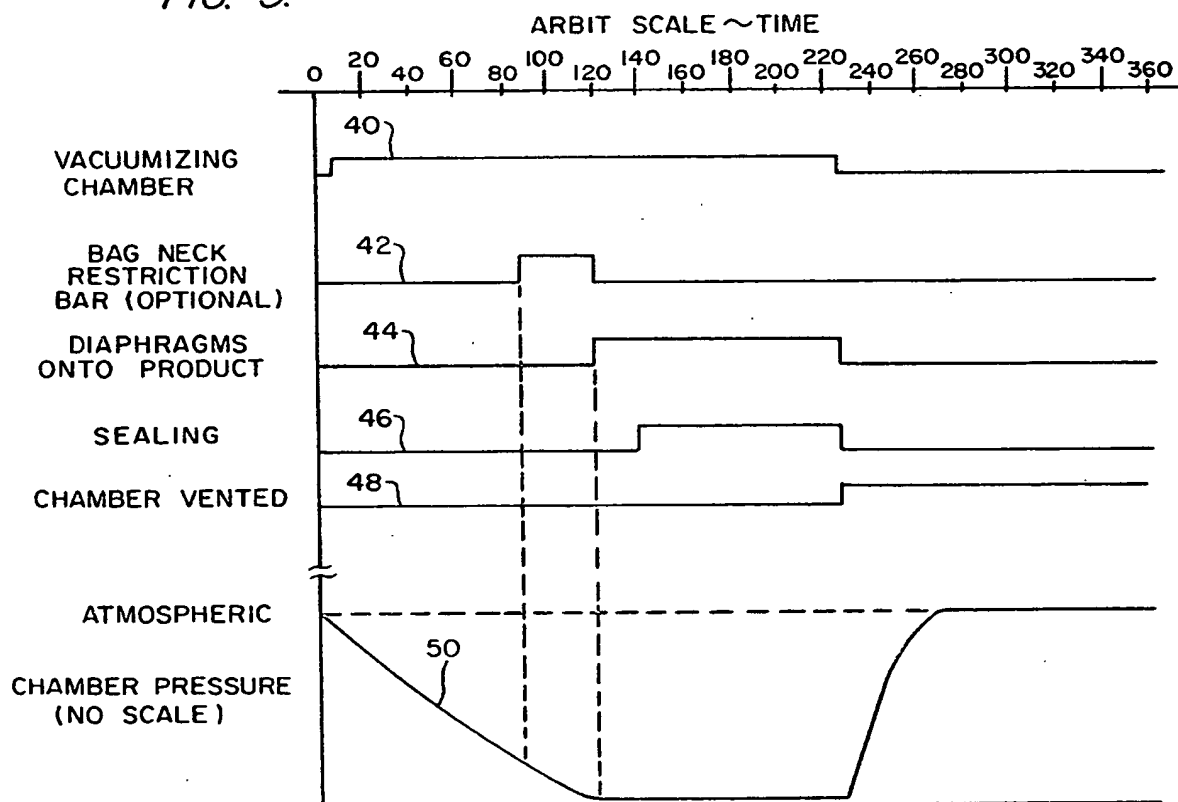


FIG. 5.



VACUUM PACKAGING GOODS IN HEAT SHRINKABLE PLASTIC BAGS USING FLEXIBLE DIAPHRAGMS

FIELD OF THE INVENTION

This invention relates to method and apparatus for packaging goods. Particularly, it pertains to vacuum packaging food in heat shrinkable plastic bags.

BACKGROUND

A patent, somewhat related to the present invention, is U.S. Pat. No. 4,132,048, which was issued to T. T. Day on Jan. 2, 1979. In the Day patent, which is owned by W. R. Grace & Co., the assignee of the present invention, the bag inside the chamber and the chamber are both evacuated to a relatively low reduced pressure, at which time the bag is sealed inside the chamber. Continued evacuation of the air in the chamber outside the bag caused the bag to balloon out due to residual air pressure therein, at which time it is heated by heaters on the inside of the chamber. The chamber is then vented in a controlled manner to aid in controlling the heat caused shrinkage of the bag onto the food product.

The Day apparatus and process operates well, but the present invention offers distinctions and additional advantages. Among these advantages are that the shrinking of the bag is controlled better. For example, as the bag is heated to a temperature at which the plastic of the bag material begins shrinking, the bag will commence shrinking regardless of whether or not that is the most opportune time with respect to the degree of evacuation of the surrounding chamber. In the present invention, the diaphragms control the start of shrinkage of the bag, and they are fully controllable.

Both the present invention and the apparatus of the above mentioned Day patent overcome numerous problems present in the prior art of hot water systems. It has been heretofore known to use pre-formed packaging such as bags for relatively large meat products such as whole rounds of beef or whole pork loins, but the art heretofore has been to shrink these bags using hot water. There are many disadvantages with hot water systems, including very poor utilization of the energy in the hot water (it has been estimated that as low as 3% of the heat energy in the water goes into the useful work of bag shrinkage, and the rest is wasted). In addition, handling of the hot water itself is a great problem since the work is done in meat packing cold rooms. These cold rooms consume enormous amounts of energy to keep them refrigerated and thus floor space is very valuable. The present invention is to a dry process, which saves all of the sloppiness and mess and safety hazards associated with water getting on the floor, and in addition it utilizes much less valuable floor space than is utilized by hot water systems.

An important advantage of the present invention resides in the provision of flexible diaphragms inside the heated platens inside the vacuum chamber. These diaphragms accommodate many difference sizes and shapes of goods, and deliver heat to all of them, as needed. The platens heat the diaphragms and the diaphragms deliver that heat to the heat shrinkable bag, and only to the bag by contact, which automatically accommodates difference sizes and shapes of products.

The invention also operates on a shorter time cycle because it does not need as low a vacuum pressure as

some prior art systems, and that achieves important advantages over the prior art.

Another advantage of the present invention's flexible heated diaphragms is that difference sizes and shapes of food products or other goods can be accommodated in one machine with no changes to the machine. In the real world of food packaging, it is unlikely that a plant which packages large cuts of beef would also package processed meat products such as salami or balogna. However, there are many different sizes and shapes of large cuts of beef and there are many different sizes of salami shaped products. Thus, the invention's heated flexible diaphragms produce important advantages over the prior art in general.

Another advantage of the invention is that when necessary a rack can be utilized in the chamber between the lower heated diaphragm and the meat product with the bag resting thereon. By controlling the size and the spacing of the wires or other material making up the rack, the amount of heat imparted to the product by the heated diaphragms can be controlled. This is important with certain products, such as certain cheeses and certain processed foods, wherein more than a predetermined small amount of heat would be unacceptable.

Another advantageous feature of the invention resides in an optional closing bar, which further improves the operation of the invention method by causing the bag to balloon out towards the diaphragms before the diaphragms contact the bag, to thus improve the shrink and the quality of the final package.

DESCRIPTION OF THE DRAWINGS

The above and other advantages of the invention will be pointed out or will become evident in the following detailed description and claims, and in the accompanying drawing also forming a part of the disclosure, in which:

FIGS. 1,3 and 4 are a series of views illustrating the method of the invention;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1 showing the manner of supporting the rack; and FIG. 5 is a timing chart showing the method.

SUMMARY OF THE INVENTION

In one aspect the invention is a method of vacuum packaging goods in heat shrinkable thermoplastic bags comprising the steps of loading a product into a heat shrinkable bag, contacting the bag with a flexible, heated diaphragm to shrink cause the bag to shrink and evacuating and sealing the bag. Evacuation can take place before, during or after the bag is contacted by the diaphragms.

In another aspect the present invention is a method of vacuum packing goods pre-loaded into a heat shrinkable bag comprising the steps of (a) providing diaphragm means which can be heated and which are operatively cooperable with said bagged goods, said diaphragm means being adapted to deliver heat to said bagged goods; (b) providing means to heat said diaphragm; (c) heating said diaphragm; (d) evacuating the air from inside said bag; (e) collapsing said diaphragm means onto said bagged goods to cause the heat in said diaphragm means to cause the bag to shrink onto said goods, and, (f) closing and sealing the bag.

In yet another aspect the present invention is a machine for vacuum packaging goods of the type wherein the goods are pre-loaded into heat shrinkable bags, said machine comprising a vacuum chamber to vacuumize

the bagged goods, the improvement comprising diaphragm means in said chamber of a size and shape sufficiently large to accommodate the largest goods to be packaged in the machine, heating means to heat said diaphragm means, means to control the motion of said diaphragm means with respect to said goods and the respective associated platen, and said diaphragm means consisting essentially of material adapted to transfer sufficient heat to the bagged goods to shrink the bag onto the goods.

DETAILED DESCRIPTION

Referring now in detail to the drawings, FIGS. 1 through 4 show apparatus comprising an outer vacuum chamber made up of a top 10 and a base 12. Other means not shown are provided to form air tight seals and the like as needed, all as is well known to those skilled in these arts. An upper platen 14 is mounted in the top 10, and a lower platen 16 is mounted on base 12. Mounting means, which may comprise yokes, nuts and bolts and the like, are provided to removably mount the platens 14 and 16, and these means also permit interchanging of the platens, as is also well known to those skilled in these arts.

By way of example, the drawings show a product "P" which has been pre-packaged into a bag "B" and has been put inside the chamber. A rack 28 is provided on which the product "P" rests. FIG. 2 shows how the rack simply rests on base 12 and is shaped to fit inside the lower platen 16. The rack is an optional feature, as explained below, and other sizes, shapes and types of racks can, of course, also be used.

The primary improvement of the invention resides in a pair of identical diaphragms 18, which are fixed to the lips of the upper and lower platens 14 and 16 as indicated in the drawings. Diaphragms are a well-developed art. A suitable flexible rubber or rubber-like material will be selected, based on its ability to withstand repeated flexing, contact with the food product and the rack 28, and its ability to transmit heat from the heated platens 14 and 16 to the food product. These are the main criteria in selecting the material for the diaphragms 18. As shown in the drawings, the upper diaphragm appears slightly larger than the lower, and the diaphragms can be the same or different, as a matter of design choice.

In addition to heating the diaphragms, means are provided to control their motion towards and away from the food product and to hold them in contact with the heated platens. To this end, conduits 30 extend to the upper and lower platens and are connected to a vacuum pump to withdraw the air from between each diaphragm and its platen. This pressure is called V_D . As is quite clearly apparent from the FIGS. 1 and 2, when V_D is applied, the diaphragms expand out into contact with the platens, as shown in FIG. 3. When this pressure is relieved, as indicated in FIG. 4, then the diaphragms collapse onto the product "P". Means are also provided for chamber vacuumization and pressure. Another pipe 32 is provided, and the vacuumizing pressure V_C is supplied to the system through this pipe 32.

As is well-known to those skilled in the art, the machine shown in the drawings can be associated with two separate vacuumizing systems, or with a single system having a three-way valve to direct the vacuum pressure to one, both, or neither of the two pipes 30 and 32. In any case, those skilled in this art know how to provide the vacuum pressures V_C and V_D to the pipes 30 and 32

respectively, in order to control the motion of the diaphragms and to vacuum-pack the product "P", as set forth in the method described below. FIG. 4 shows how the diaphragms are collapsed down onto the bagged product at the final step of the packaging, again as will be explained with respect to the method below.

The rack 28 will create an unheated section in the bag but will also control the heating of the food product "P" resting thereon. With, for example, cheese and certain other foods, heat must be very closely controlled or the product's esthetics or even its fitness as food can be adversely affected. The invention contemplates using racks of different sizes and shapes as needed to control the degree to which the food product is heated by contact with the heated lower diaphragm. For example, if the bars or other elements used to fabricate rack 28 were made thicker and/or positioned closer together, then the food product resting thereon would be heated less by the heat from the lower diaphragm. However, a concurrent disadvantage is that that portion of the bag on the rack is not heated as much as other portions of the bag. This will cause an irregularity in the manner in which the bag shrinks around the product, as is explained below, but which is not a serious problem. With many products, the rack can be omitted and the product put directly on the lower heated diaphragm.

It is anticipated that this problem can be overcome in a number of ways. Firstly, for certain products, this irregular area may not matter, i.e., products which have top and bottom surfaces. For example, if a quantity of chicken parts were to be shrink wrapped on a flat tray or the like, the underside of the tray or the like does not matter, and its contact with the rack and any resultant irregularity of the shrink has no effect. However, in some products this could make a difference, i.e., whole poultry. This problem can be overcome, as one possible solution, by providing a very large degree of shrink. That is, if the various parameters of the bag before and after shrinking are controlled such that the bag will have to shrink a great deal, then this large amount of shrinkage can literally "overpower" any possible irregularity created by the rack.

Thus, the advantage of controlling the heat imparted to the food so that no adverse effect is experienced by the food is obtained. Any problem of irregular shrink of the bag, if there is any, is overcome using other aspects of the teaching of the invention.

In general, the present invention provides an adequate package as to wrinkling and uniform fitting of the bag onto the goods, but, primarily, it solves problems in the prior art of limitations on the size of the goods relative to the chamber size which can be accommodated, i.e., it imparts great versatility as to sizes and shapes of goods which can be packaged in a single machine.

The bag may be made of any suitable packaging material including but not limited to thermal plastics such as polyethylene, cross-linked ethylene, polypropylene, saran, ethylene vinyl alcohol copolymers, nylon, polyvinyl fluoride, and the like, and laminates of these materials. Of course, other materials known to those skilled in the art can also be used.

It is conventional in this art to provide means inside the vacuum chamber to close, to seal, and to cut off excess bag material outboard of the seal. These means are well developed and generally well known, and are indicated herein by sealing means 22, cut-off means 24, and means 26 having the ability to close the bag in an air

tight manner, but not seal the bag, to later re-open the bag, and still later to permit sealing the bag using means 22.

Means, indicated by wire 20 connected to the two platens, are provided to heat the upper and lower platens 14 and 16. Heating of platens is known in this art, reference may be had to the Day patent referenced above as needed. Sufficient to say that the heating means deliver enough heat via the diaphragms to shrink the bag. The heat may be most conveniently supplied by electrical resistance means as is well known. While this is the preferred method of heating the platens which in turn heat the diaphragms, the platens, in an alternate embodiment could be eliminated and the diaphragms heated by an electrical resistance such as a mesh of flexible wires or strips.

The method of the invention comprises the following steps, which will be accompanied by references to the drawings as they appear in the sequence of steps.

In general, the method of the invention is to package products and bags smaller than the maximum capacity of the platens 14 and 16. The advantage resides in the fact that the bagged products can range from considerably smaller than, up to the full capacity of the maximum possible with any particular pair of platens 14 and 16. The diaphragms are preheated by being drawn out into contact with the platens, and then drawn in due to the vacuum conditions inside the machine in general onto the bagged product, to thus heat the bag and cause it to shrink down onto the product. An optional feature is that the clamp or seal bar 26 can be used to first balloon out the bag before the diaphragms come in onto it, to thus improve the manner in which the heated diaphragms cause the bag to shrink.

More in particular, the method steps are:

(1) The preloaded bag "B" with the product "P" is placed on the rack 28 in the open machine, with the mouth of the bag positioned over the closing sealing and cutting means 22, 24 and 26. This is shown in FIG. 1.

(2) The machine is closed onto the bag, and V_D is applied to draw the diaphragm 18 out into contact with the platens 14 and 16. (V_D may remain applied when the chamber is open, if desired. In the alternative, the platen heaters can remain heated.)

(3) The platen heaters are activated to begin heating.

(4) Vacuum pressure V_C is applied to the chamber 10-12 to evacuate the air from inside and outside the bag. This is shown in FIG. 2.

(5) As an option, while the evacuation by V_C is continuing, near the end of that cycle, the retaining or restriction bar 26 can be closed down onto the bag for a relatively short period of time to cause the bag to balloon out. This condition is shown in FIG. 5 on timing bar line 42. The scale 0 to 360 along the top of FIG. 5 is an arbitrary set of numbers to indicate relative interactions of the various events. The bag restriction bar is indicated by line 42, and the fact that it occurs during the vacuumizing of the chamber on the line 40 is evident.

(6) V_C evacuates the chamber and the bag to the same vacuum pressure. This can be momentarily, as is clear from FIG. 5 when the clamp bar option is used.

(7) The vacuum pressure V_D on the diaphragms is released or vented to atmosphere while the vacuum pressure in the chamber V_C continues. This causes collapse and shrinkage of the bag driven by the hot diaphragms onto the product, and is the condition shown

in FIG. 4. The rack 28 is, of course, between the diaphragm and the bag.

(8) The bag is then permanently sealed or clipped shut using means 22, and the excess bag material is cut off by means 24. (Preferably, final sealing occurs shortly after the chamber reaches the desired pressure). Clipping means are well known in this art, see U.S. Pat. No. 3,832,824 to Burrell assigned to the same assignee as the present invention, for example.

(9) V_C is turned off and the chamber vented to the atmosphere which causes an additional final tight collapse of the bag onto the product.

(10) The chamber is opened and package is removed.

The line 46 indicates the operation of the sealing means 22, and the line 50 shows the effect of V_C between atmosphere and the vacuumizing pressure, as indicated by line 50.

The word "platen" as used in the specification and claims herein shall be understood to include various sizes and shapes of such means useful in the invention and not be limited to flat devices as the word is sometimes defined in dictionaries.

While the invention has been described in detail above, it is to be understood that this detailed description is by way of example only, and the protection granted is to be limited only within the spirit of the invention and the scope of the following claims.

We claim:

1. A method of vacuum packing goods pre-loaded into a heat shrinkable bag and heat shrinking the bag comprising the steps of (a) providing flexible diaphragm means which can be heated and which are operatively co-operable with said bagged goods, said diaphragm means being adapted to deliver heat to said bag; (b) providing platen means substantially surrounding but defining a space larger than the bagged goods, said platen means including means to heat said diaphragm means; (c) heating said diaphragm out of contact with said bag by bringing said diaphragm means into contact with said platen means; (d) evacuating the air from inside said bag; (e) collapsing said heated diaphragm into contact with the bag to heat and to shrink the bag onto said goods; (f) and, closing and sealing the evacuated bag.

2. The method of claim 1 and the additional step of locating the bagged goods in a vacuum chamber to thereby evacuate the air from both inside and outside the bag, and temporarily closing the bag while performing said evacuating step to cause the bag to balloon out towards said diaphragm means prior to said step of collapsing said diaphragm means onto said bag.

3. The method of claim 1, and providing a predetermined size and shape of said platen means and of said diaphragm means adapted to cooperate with the maximum of the particular shape of the goods and of the bags being packed.

4. The method of claim 3, wherein the method is carried out by and in a vacuum packing machine, and selecting a removably mounted heated diaphragm and cooperative platen of a size and shape to permit packaging of different sizes and shapes of goods and of bags.

5. The method of claim 3, including the step of providing heated diaphragm means to support the goods thereon, whereby the amount of heat imparted to the goods from said heated diaphragm means can be controlled.

6. The method of claim 1, wherein said step of bringing said diaphragm in contact with said heated platen

means comprises means to permit evacuation of the space between said platen means and said diaphragm means.

7. The method of claim 1, wherein said step of closing and sealing the bag comprises the use of means to heat seal the bag.

8. In a machine for vacuum packaging goods of the type wherein the goods are pre-loaded into heat shrinkable bags, said machine comprising a vacuum chamber to vacuumize the bags, the improvement comprising: diaphragm means in said chamber of a size and shape sufficiently large to accommodate the largest goods to be packaged in the machine; platen means which include heating means to heat said platen and consequently heat said diaphragm means by contact therewith, said diaphragm means being substantially enclosed by said platen means and consisting essentially of material adapted to transfer sufficient heat to the bag to shrink it onto the goods; and, vacuum means to create alternate pressure differentials across said diaphragm whereby said diaphragm means can be drawn into contact with said platen means and then the thus heated diaphragm can be collapsed upon said bag.

9. The combination of claim 8, wherein said platens comprise upper and lower platens, and including rack means operatively cooperable with said lower platen to support the goods out of contact with said lower platen, said rack means being so configured as to control the heat from said diaphragm imparted to the goods resting on said rack means.

10. The combination of claim 8, including means to heat seal the bag in said vacuum chamber.

11. The combination of claim 8, including closure means in said chamber adapted to close but not seal said bag, whereby the bag may be caused to balloon out towards said heated diaphragm means to improve the shrink and fit of the bag onto the good in the resultant package.

12. The combination of claim 8, including means in said chamber to heat seal the bag.

13. The method of claim 1 wherein step (d) is performed before step (e).

14. The method of claim 1 wherein step (d) is performed after step (e).

15. The method of claim 1 wherein step (e) is performed while step (d) is being performed.

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